

NEW AND LITTLE KNOWN DINOTOPERLINE STONEFLIES FROM AUSTRALIA
(INSECTA: PLECOPTERA: GRIPOPTERYGIDAE)

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ABSTRACT

Two new genera, *Dundundra* and *Nesciopterla*, from Queensland and a new subgenus of *Illiesoperla* McLellan, *Tonyoperla*, from New South Wales are erected. The adults of the following new species are described: *Dinotoperla arcuata* (♂, ♀), *D. cobra* (♂, ♀) and *D. leonardi* (♂, ♀) from Queensland and New South Wales, *Dinotoperla bunya* (♂, ♀), *D. cardaleae* (♂, ♀), *D. carnarvonensis* (♂, ♀), *D. duplex* (♂, ♀), *D. eungella* (♂, ♀), *D. kirramia* (♂, ♀), *D. schneiderae* (♂), *D. spinosa* (♂), *D. vulcanica* (♂, ♀), *D. wanungra* (♂), *Dundundra baiame* (♀), *Nesciopterla curtisae* (♂, ♀), *Illiesoperla* (*I.*) *cerberus* (♂, ♀), *I.* (*I.*) *tropica* (♂, ♀), *Trinotoperla minima* (♂, ♀), and *T. mouldsi* (♂, ♀) from Queensland, *Dinotoperla dolichoprocta* (♂, ♀), *D. parabrevipennis* (♂, ♀), *D. pseudodolichoprocta* (♂, ♀), *Neboissoperla monteithi* (♂), *Illiesoperla* (*Tonyoperla*) *frazieri* (♂, ♀) and *Trinotoperla maior* (♂, ♀) from New South Wales and *Trinotoperla sinuosa* (♂, ♀) from Victoria.

Descriptions of the hitherto unknown males are given of *Dinotoperla fasciata* Kimmins and *Trinotoperla groomii* Perkins. Illustrations or diagnoses, or both, are presented of the adults of *Dinotoperla carpenteri* Tillyard (♂, ♀) and of the last instar nymphs of *Illiesoperla* (*I.*) *cerberus* sp.n., *I.* (*I.*) *franzeni* Perkins, *I.* (*I.*) *mayi* Perkins, *I.* (*I.*) *tropica* sp.n., *Trinotoperla groomii* Perkins, *T. minima* sp.n., *T. montana* Riek, *T. sinuosa* sp.n. and *T. yeoi* Perkins.

The names *hirsuta* McLellan, *fontana* Kimmins and *uniformis* Kimmins in *Dinotoperla*, *franzeni* Perkins, *mayi* Perkins, *perkinsi* McLellan and *tasmanica* McLellan in *Illiesoperla* and *groomii* Perkins, *minor* Kimmins and *montana* Riek in *Trinotoperla* are reinstated. *Dinotoperla arenaria* Hynes is considered as a junior synonym of *D. eucumbene* McLellan. It is stated that *Trinotoperla woodwardi* Perkins is certainly not synonymous with *T. irrorata* Tillyard.

INTRODUCTION

In two papers (Theischinger 1980, 1981) I presented mainly descriptive data for Australian Leptoperlinae and Notonemouridae from the Australian National Insect Collection (ANIC) in CSIRO, Canberra, the Australian Museum (AM) in Sydney, the University of New England (UNE) in Armidale and my own collection (GTS or GT).

In this paper these contributions to taxonomy are continued with a study of Dinotoperlinae, including in addition the rich material of the Queensland Museum (QM) and of the University of Queensland (UQ), both in Brisbane.

The delimitation of species in this paper relies on morphological characters, particularly of the male genitalia, and on the inference that constant and marked differences found between the various forms are due to their reproductive isolation.

Abbreviations for collector's names:

B.K. Cantrell	BKC	C.N. Smithers	CNS
G.B. Monteith	GBM	G. Theischinger	GT
S.R. Monteith	SRM	T. Weir	TW
L. Müller	LM	T.E. Woodward	TEW
F.A. Perkins	FAP	I.C. Yeo	ICY
E.F. Riek	EFR		

ACKNOWLEDGEMENTS

For giving me the opportunity to study material in their care I am very grateful to the following persons who also have supported me in many ways: Miss J.C. Cardale (Canberra), Miss M. Schneider and Dr. G.B. Monteith (Brisbane), Dr. D.K. McAlpine and Dr. C.N. Smithers (Sydney), Prof. A.F. O'Farrell (Armidale).

KEY TO GENERA AND SUBGENERA OF
DINOTOPERLINAЕ (ADULTS)

- 1 — Forewing with Rs simple 2
 — Forewing with Rs branched 5
- 2 (1) — Hindwing with M3+4 separate from Cul* *Dundundra*
 — Hindwing with M3+4 partially fused with Cul 3
- 3 (2) — Only 1 distal crossvein in each cell between Rs and Cula of forewing, wings normal *Nesciooperla*
 — More than 1 distal crossvein in each cell between Rs and Cula of forewing, or (exceptionally) brachypterous 4
- 4 (3) — Male epiproct with two 'apical' spurs (as in Fig. 18); female with lateral lobe of paraprocts narrow (width at inner margin of cercus 1/3 full width of paraproct) *Neboissooperla*
 — Male epiproct with one apical spur only (as in Figs 1-16); female with lateral lobe of paraprocts wide (width of inner margin of cercus 1/2 or more full width of paraproct) *Dinotoperla*
- 5 (1) — Hind margin of metabasisternum straight 6
 — Hind margin of metabasisternum with medial V-shaped cleft *Illiesoperla*
- 6 (5) — Series of crossveins between Cu2 and 1A in forewing *Eunotoperla*
 — Not more than one crossvein between Cu2 and 1A in forewing *Trinotoperla*
- 7 (5) — No proximal crossveins between R and Rs *Illiesoperla* s.str.
 — Proximal crossveins between R and Rs *Tonyoperla*

* This particular character of *Dundundra*, exceptional not only for Dinotoperlinae but also for Gripopterygidae, is discussed below under *Dundundra* (q.v.).

DINOTOPERLA Tillyard

To avoid repetition in the following descriptive text the general descriptions are restricted to characteristic features. All species when fully mature seem to have black markings on the outer side of the base of meso- and meta-coxa and some dark dots or a dark line anteriorly along lateroventral edge of meso- and meta-thorax as

well as heavily darkened ventral edges of all femora and darkened knees in all legs. There are, without exceptions, between 2 and 6 (generally 3-4) distal crossveins in all cells between Rs and Cula of forewing.

As it was not possible to obtain fully mature or perfectly sclerotized specimens of many species the degree of darkness and the development of wing pattern given in the descriptions may not be correct for individuals of other age groups.

DINOTOPERLA *ARCUATA*, sp.n. (Fig.1 A-E)

MATERIAL. Queensland: holotype ♂ and 8 paratypes (6 ♂, 2 ♀), Cunningham's Gap, 17.iii.1956, ICY; holotype in QM (T.8507), paratypes in UQ. 2 paratypes (♂), Cunningham's Gap, 3.ii.1958, collector unknown; 1 ♂, Cedar Ck, 9.xi.1954, TEW; 1 ♂, Highvale, 25.viii.1955, ICY; 1 ♂, Tamborine Mtn, 3.ix.1961, R.G. Winks; 1 ♂, Upper Cedar Ck, via Samford, 5.iv.1964, GBM; 1 ♂, Upper Brookfield, 3.iv.1967, GBM; 1 ♂, Samford, 2.ix.1967, K.C. Teoh; all in UQ. 1 ♂, Mt Mee, 9.i.1971, SRM; in ANIC. New South Wales: 1 ♂, Boonoo-Boonoo River, NNE. of Tenterfield, 7.xi.1976, GT and LM; in GT.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-7.5	8.0-9.5
♀	6.5-7.5	10.0-11.0

Body yellowish to dark brown. Wings almost hyaline; only very faint suffusion of pale greyish yellow; darker in pterostigma area and around distal crossveins of forewing.

MALE GENITALIA (A-E): Central sclerite of tergite X produced posteriorly into a straight substantial membranous cone. Epiproct long, not deep, keeled ventrally for about the second third of its length, with downcurved pointed apical and obtuse subapical spur. Paraprocts with short, wide base, otherwise rather long, evenly arched, almost parallel sided, with well rounded apex and very small subapical dorsal tooth. Cerci 9-11 segmented; basal segment very long, well arched with inner side concave, outer side convex. Basal sclerite of cercus very large and prominent on inner side.

FEMALE GENITALIA: Specimens teneral: Subgenital plate wide, very slightly bilobed. Paraprocts short. Hindmargin of tergite X rounded. Cerci 9-11 segmented.

AFFINITIES AND DIAGNOSIS: The closest ally of *Dinotoperla arcuata* sp.n. is probably *D. wanungra* sp.n. from Lamington National Park, but *D. carnarvonensis* sp.n. from Carnarvon Gorge and *D. vulcanica* sp.n. from Crater N.P. also appear related. Distinguishing characters of male *D. arcuata* are the very long, strongly arched basal segment of the cerci, the rather pointed and straight cone of tergite X, the long ventrally keeled and dorsally unarmed epiproct and the parallel sided, evenly arched paraprocts with their minute subapical tooth.

DISTRIBUTION: *D. arcuata* sp.n. is known from many localities in southeastern Queensland and from northeastern New South Wales. Other *Dinotoperla* species in the same localities are *D. bunya* sp.n., *D. carpenteri* Tillyard, *D. fasciata* Kimmins, *D. schneiderae* sp.n. and *D. uniformis* Kimmins.

DINOTOPERLA BUNYA, sp.n. (Fig. 2 A-D)

MATERIAL. Queensland: holotype ♂ (T.8508) and 1 paratype (♀) (T.8509), Bunya Mts, 10.viii.1955,

TEW; in QM. 1 ♀, Bunya Mts, 26.iii.1957, EFR; in ANIC. 1 ♂, Cunningham's Gap, 3.ii.1958, collector unknown; in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.5-8.0	8.5-10.0
♀	8.0-10.0	10.8-11.0

Body variably brown. Wings with slight suffusion of brownish grey and darker patches around distal crossveins of forewing.

MALE GENITALIA (A-C): Central sclerite of tergite X hardly produced posteriorly. Epiproct long, narrow, basal two thirds bulging ventrally, apical third parallel sided with simple ventrally directed single spur. Paraprocts with strong short base, remainder boat-shaped, almost straight dorsally, slightly but evenly bowed ventrally. Cerci 11 segmented.

FEMALE GENITALIA (D): Subgenital plate about square, bulged with median incision at posterior margin. Paraprocts with long apical lobe.

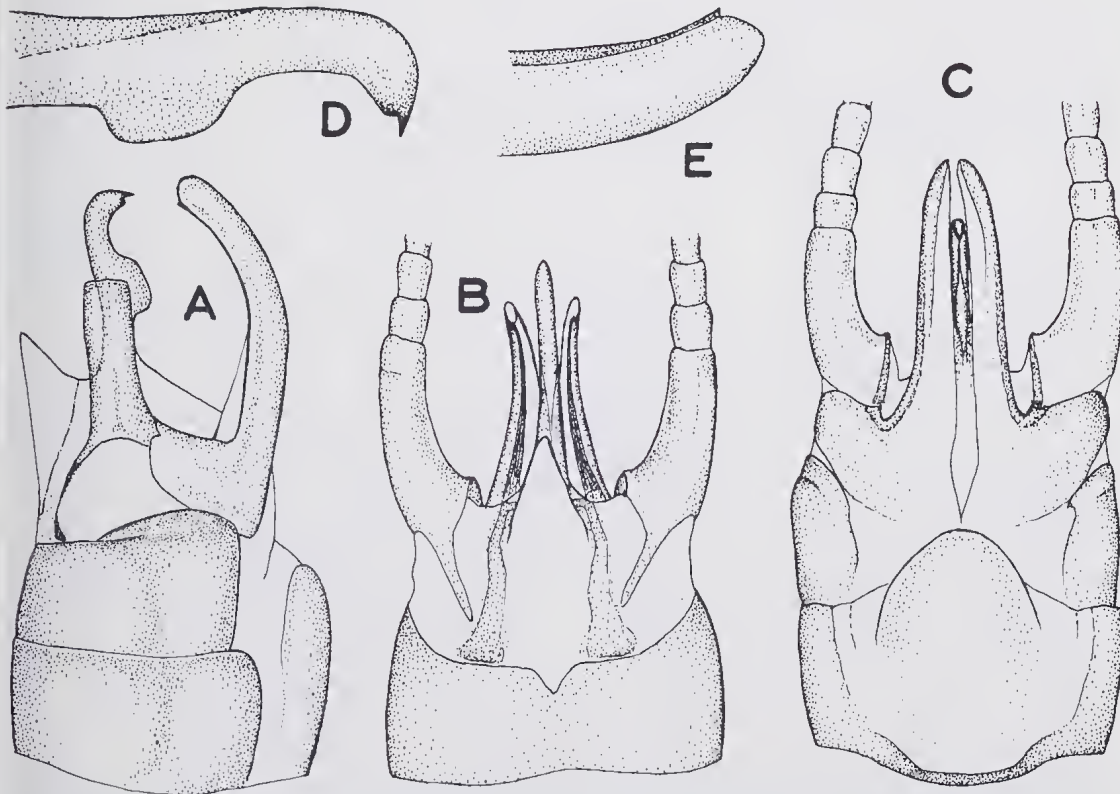


FIG. 1. *Dinotoperla arcuata* sp.n. male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E: tip of paraproct, lateral view.

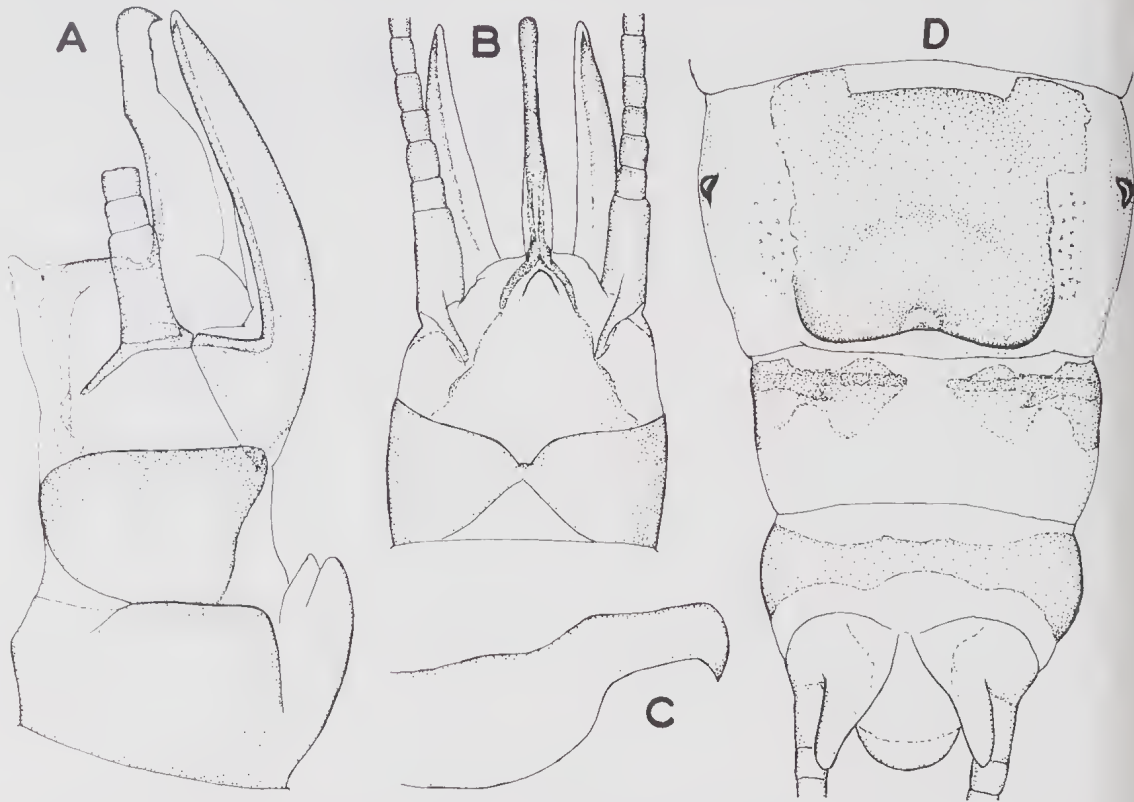


FIG. 2. *Dinotoperla bunya* sp.n.: A-C, male: A, B, genitalia: A, lateral view; B, dorsal view; C, epiproct of specimen from Cunninghams Gap, lateral view; D, female genitalia, ventral view.

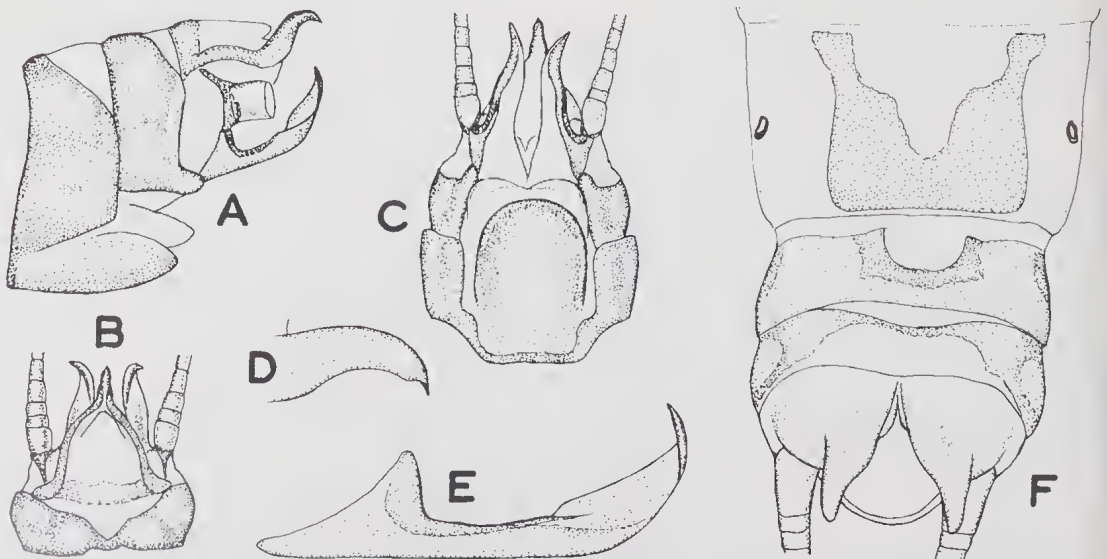


FIG. 3. *Dinotoperla cardaleae* sp.n.: A-E, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, lateral view; F, female genitalia, ventral view.

Hindmargin of tergite X evenly rounded. Cerci with 10–11 segments.

AFFINITIES AND DIAGNOSIS: *Dinotoperla bunya* sp.n. is somewhat similar and perhaps most closely related to *D. eungella* sp.n. from Eungella Range in northern Queensland. Even from this species it can be easily separated by its simple epiproct and by its strong based almost straight and unarmed paraprocts.

DISTRIBUTION: The species is the only known *Dinotoperla* from Bunya Mountains while it coexists at least with *D. arcuata* sp.n. and perhaps with *D. schneiderae* sp.n. in Cunninghams Gap.

DINOTOPERLA CARDALEAE, sp.n. (Fig. 3 A–F)

MATERIAL. Queensland: holotype ♂ and 1 paratype (♀), Birthday Ck Falls, via Paluma, 11/12.v.1980, I.D. Naumann and J.D. Cardale; in ANIC. 10 ♀, Millaa Millaa, 9.i.1964, GBM; in UQ. Millaa Millaa Falls: 2 ♂, 4.xii.1965, GBM; 2 ♂, 13 ♀, 10/11.xii.1966, BKC; 1 ♂, 1 ♀, 12.viii.1968, TW; in UQ. 3 ♀, Mt Spec, 22.iv.1968, BKC; in UQ. Mt Spec, via Paluma: 1 ♀, 17.xii.1966, BKC; 1 ♂, 1 ♀, 21.iv.1968, GBM; in UQ. 1 ♂, 1 ♀, Mt Spec 2600ft, 4.iii.1964, I.F.B. Common and M.S. Upton; in ANIC. 3 ♀, Ringrose (= Crater) N.P., via Atherton, 9.xii.1966, BKC; in UQ. 1 ♂, Whitfield Ra., nr Cairns, 15.xii.1974, M. Moulds; in AM. 2 ♂, 3 ♀, Kirrama State Forest (Western Fall), 30.v.1971, EFR; in ANIC.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	5.5–7.0	7.5–8.5
♀	7.0–9.0	8.5–9.5

Body brownish yellow to greyish brown. Wings suffused with pale greyish yellow, brownish grey around crossveins and in pterostigma area of forewing.

MALE GENITALIA (A–E): Posteroventral corner of tergite IX produced into a rounded lobe. Central sclerite of tergite X slightly produced posteriorly into a small membranous hummock. Epiproct tapered as seen from above, an evenly curved S-shaped hook with simple pointed apical spur in lateral view. Paraprocts with moderately long and wide base, otherwise well curved dorsad, mostly slightly widened, showing an obtuse angulation dorsally, at about half length, apical part twisted inward, foliate, with pointed tip. Cerci with 10–11 segments, basal segment short.

FEMALE GENITALIA (F): Subgenital plate wide with almost straight to slightly convex posterior margin. Sclerotization on sternite IX with anteromedian semicircular excision. Paraprocts with swollen base and narrow apex. Hind margin of tergite X rounded. Cerci 10–11 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla cardaleae* sp.n. clearly stands out from all known congeners by its peculiar processes of tergite IX and by the twisted foliate paraprocts of the male. A closely related species is not known.

DISTRIBUTION: Being known from Kirrama State Forest, Crater N.P., Paluma, Mt Spec, Millaa Millaa and Whitfield Range the species appears to have a fairly large range. Other species of *Dinotoperla* occurring in those localities are *D. kirrama* sp.n. in Kirrama, and *D. vulcanica* sp.n. in Crater National Park.

DINOTOPERLA CARNARVONENSIS, sp.n.
(Fig. 4 D–G).

MATERIAL. Queensland: holotype ♂ and 7 paratypes (3 ♂, 4 ♀), Carnarvon Gorge, 26/29.v.1954, FAP and collector unknown; holotype (T.8510), and 1 paratype (♀) (T.8511) in QM, others in UQ. 2 paratypes (♀), Carnarvon Gorge, 11/13.x.1980, GT and LM; in GT.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	7.5–8.0	9.5–11.0
♀	8.0–9.0	11.0–12.0

Body greyish yellow to blackish brown, clothed largely, but particularly between ocelli and on ventral surface of abdomen with scattered black hairs. Wings slightly suffused with brownish grey, dark patches around distal crossveins of forewing.

MALE GENITALIA (D–F): Central sclerite of tergite X only slightly produced posteriorly into a minute irregular knob-like cone. Epiproct very short and deep, narrow, very obtusely hook-like. Paraprocts with short wide and hairy base, covering part of outer side of cercus base, otherwise long, slim, evenly arched, with subapical tooth. Cerci with short basal segment and inner basal sclerite strongly developed, 13–15 segments altogether.

FEMALE GENITALIA (G): Subgenital plate wide, slightly bilobed. Posterior margin of tergite X rounded. Paraprocts short, subtriangular. Cerci 11–13 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla carnarvonensis* sp.n. together with *D. arcuata* sp.n., *D. vulcanica* sp.n. and perhaps *D. wanungra* sp.n. represent possibly a monophyletic group within *Dinotoperla*. *D. carnarvonensis* is distinguishable from the others by conspicuous additional scattered body hair in both sexes, and by the male having tergite X with central sclerite little developed, epiproct very short and high, cerci long and short based, and paraprocts long and large based.

DISTRIBUTION: *Dinotoperla carnarvonensis* sp.n. is the only *Dinotoperla* hitherto found at Carnarvon Gorge. It is not known from anywhere else.

DINOTOPERLA CARPENTERI Tillyard, 1921
(Fig. 5 A-F).

Tillyard (1921) described both sexes of this species from Hornsby, New South Wales.

Kimmins (1951), unable to locate the type material, repeated and tried to interpret Tillyard's description. For the same reason McLellan (1971) did not proceed any further. Hynes (1974), however, without having located the missing types, surmised the possibility that *D. carpenteri* Tillyard might be the valid name (oldest synonym) for all the forms he had united under *D. serricauda* Kimmins.

I was also unable to trace the type material but fortunately I got material matching closely

Tillyard's description and illustrations of *D. carpenteri*, from near its type locality and other places in New South Wales and Queensland. As I have no doubt that this material belongs to *D. carpenteri*, male and female genitalia are illustrated from fresh material collected in Ku-Ring-Gai Chase near Hornsby. The geographical variation shall be illustrated in a future

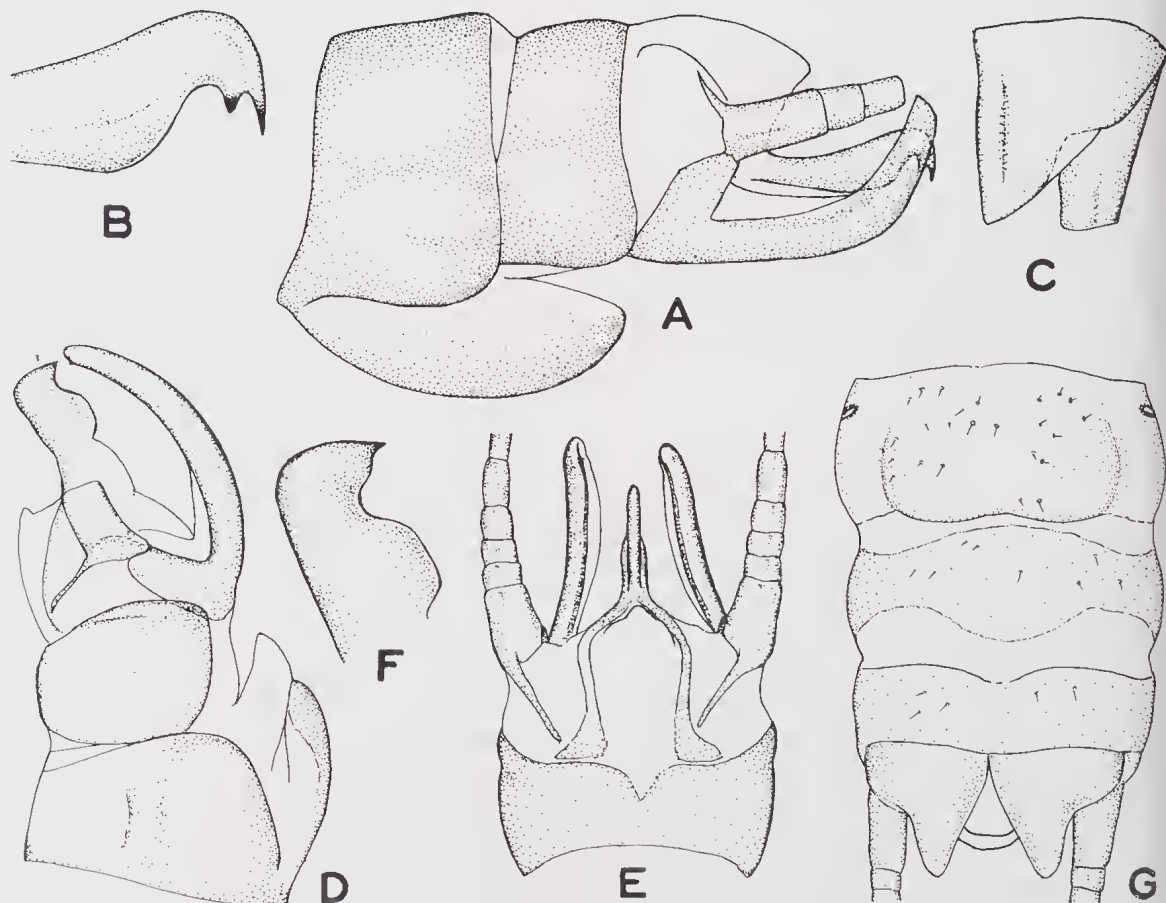


FIG. 4. *Dinotoperla duplex* sp.n.: A, B, male: A, genitalia, lateral view; B, tip of epiproct, lateral view; C, female paraproct and cercus base, ventral view. D-G, *Dinotoperla carnarvonensis* sp.n.: D-F, male: D, E, genitalia: D, lateral view; E, dorsal view; F, epiproct, lateral view; G, female genitalia, ventral view.

study (Theischinger, in preparation, on *Dinotoperla*).

MATERIAL. New South Wales: Barrington House, via Salisbury: 1 ♂, 28.v.1963, GBM; 2 ♂, 1 ♀, 18/19.xii.1963, A. MacQueen; all in UQ. 2 ♂, Barrington Tops, Allyn R. (upper), 10.x.1976, GT; 1 ♂, Blue Mts, Glenbrook, 8.x.1976, GT; 1 ♂, 1 ♀, Cangai Ck (main stream), 22.viii.1980, C.D. and G. Theischinger; 1 ♂, 3 ♀, Heathcote Brook, 10.ix.1980, GT; 1 ♂, 3 ♀, McDonald R, nr St Alban, 16.x.1976, GT; 2 ♂, Upper Falls, Royal N.P., 8.ix.1980, GT; all in GT. 4 ♂, 2 ♀, Ku-Ring-Gai Chase, 11.viii.1966, CNS; 1 ♂, Upper Allyn, 6.xi.1961, C.N. and A.S. Smithers; all in AM. Queensland: 2 ♂, Cedar Ck, Samford, 6/19.xii.1962, GBM; 1 ♂, Lamington N.P.,

4.xi.1943, collector unknown; 1 ♂, Springbrook, 11.iv.1955, R.E. Harrison; all in UQ.

AFFINITIES AND DIAGNOSIS: The affinities of *D. carpenteri* are not clear to me at all. Diagnostic features are the very long and sharply pointed paraprocts of the male and possibly the distinctively bilobed subgenital plate of the female.

DISTRIBUTION: I have seen what I consider to be *D. carpenteri* from several localities from Samford in southern Queensland to south of Sydney. Other *Dinotoperla* species found in these localities are *D. arcuata* sp.n., *D. cobra* sp.n., *D. dolichoprocta* sp.n., *D. fasciata* Kimmins and *D. serricauda* Kimmins.

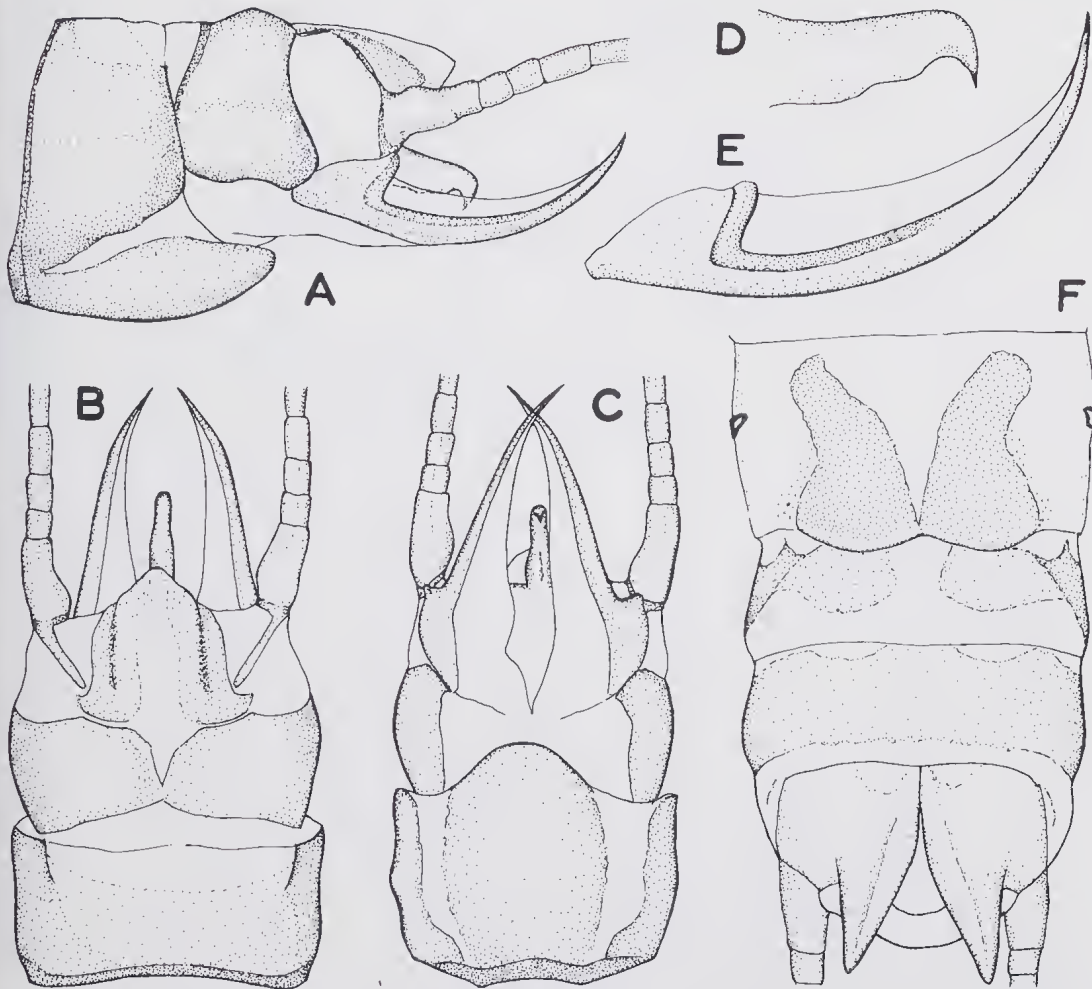


FIG. 5. *Dinotoperla carpenteri* Tillyard: A-E, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, lateral view; F, female genitalia, ventral view.

DINOTOPERLA COBRA, sp.n. (Fig. 6 A-G)

MATERIAL. New South Wales: holotype ♂ and 3 paratypes (2 ♂, 1 ♀), Barrington Tops, Upper Allyn R., 10.x.1976, GT and LM; holotype in ANIC, 3 paratypes (2 ♂, 1 ♀) in GT. 9 paratypes (5 ♂, 4 ♀), Barrington Tops, 1/5.xi.1957, FAP; in UQ. 6 paratypes (5 ♂, 1 ♀), Barrington Tops, 30.xii.1961, C.N. and A.S. Smithers; in AM. 2 paratypes (♀), Upper Allyn R., 1000-1500 ft, 8/9.xi.1960, I.F.B. Common and M.S. Upton; 4 ♂, 1 ♀, Wiangaree State Forest, via Kyogle, 18.xi.1974, SRM; in ANIC. Queensland: 1 ♂, Lamington N.P., OR, 15.xi.1955, ICY; 1 ♂, Lamington N.P., Lower Moran's 25.x.1957, ICY; 1 ♂, Upper Coomera R., 28.i.1963, GBM; 1 ♂, Lamington N.P., 22/26.xii.1967. TW; all in UQ.

ADULTS. Measurements (in mm):

	Body	Forewing
♂	6.5-8.0	8.5-9.5
♀	8.0-9.0	10.5-12.0

Body variably yellowish to greyish brown. Wings with pale yellowish grey tint, darker between C and R, and greyish brown patches around distal crossveins in forewing.

MALE GENITALIA (A-E): Central sclerite of tergite X produced posteriorly into a very large pointed membranous cone. Epiproct snake-shaped (see name), long and thin, tapered as seen from above, slightly bent dorsad at about half length, with a very small tooth-like apical ventral spur. Paraprocts with very short and rather narrow base, strongly but evenly curved dorsad, with pointed tip. Cerci with 10-11 segments.

FEMALE GENITALIA (F, G): Subgenital plate very wide. Tergite X with peculiar pointed triangular median process. Cerci 11 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla cobra* sp.n. is possibly a close relative of *D. carpenteri* Tillyard from New South Wales and *D.*

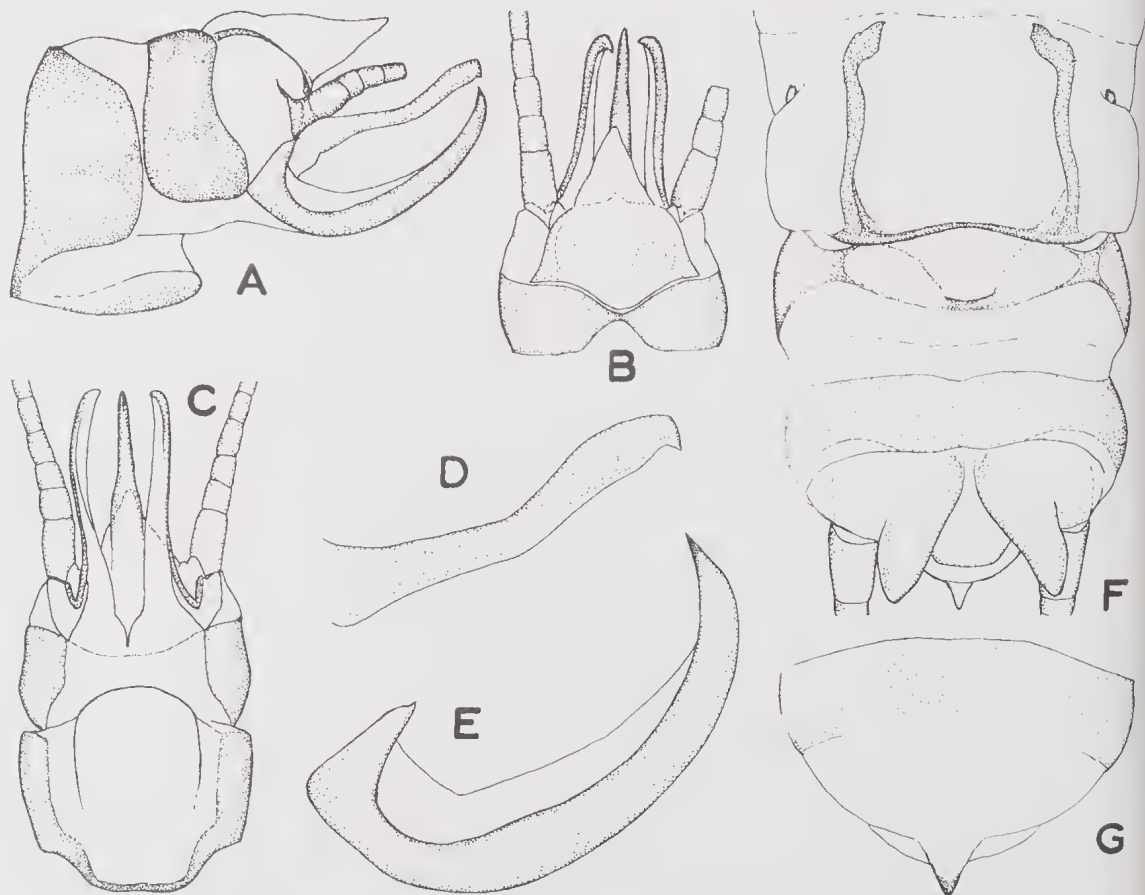


FIG. 6. *Dinotoperla cobra* sp.n.: A-E, male: A-C genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, lateral view; F, G, female: F, genitalia, ventral view; G, tergite X, dorsal view.

serriicauda Kimmins which ranges from Tasmania to northern New South Wales. It can be distinguished from these species and stands out from its other congeners by the extremely long and thin epiproct and its short based well curved, pointed paraprocts of the male and by the significant process on tergite X of the female.

DISTRIBUTION: The records of *Dinotoperla cobra*, sp.n., Lamington N.P. in Queensland, Wiangaree State Forest and Barrington Tops in New South Wales, suggest a fairly wide range. Species in the same localities and habitats: *D. carpenteri* Tillyard, *D. duplex* sp.n., *D. fasciata* Kimmins.

DINOTOPERLA DOLICHOPROCTA, sp.n.
(Fig. 7 A-H)

MATERIAL: New South Wales: holotype ♂ and 4 paratypes (2 ♂, 2 ♀), Brown Mtn, 18.i.1961, EFR; holotype and 2 paratypes (1 ♂, 1 ♀); in ANIC, 2 paratypes (1 ♂, 1 ♀) in GT. 1 paratype ♂, Brown Mtn, 11.xi.1961, D.H. Colless; 1 paratype ♂, Brown Mtn, 17.viii.1963, D.H. Colless; 2 ♀, Rutherford Ck, Brown Mtn, 9.viii.1962, D.H. Colless; 1 ♀, Clyde Mtn, Eastern Slopes, 26.x.1960, EFR; all in ANIC. 1 ♂, Blue Mts, Wentworth Falls, 22.xi.1960, CNS; 1 ♀, Royal N.P., 2.xii.1961, CNS; 1 ♀, Royal N.P., 27.vii.1963, D.K. McAlpine; 1 ♂, 1 ♀, Royal N.P.,

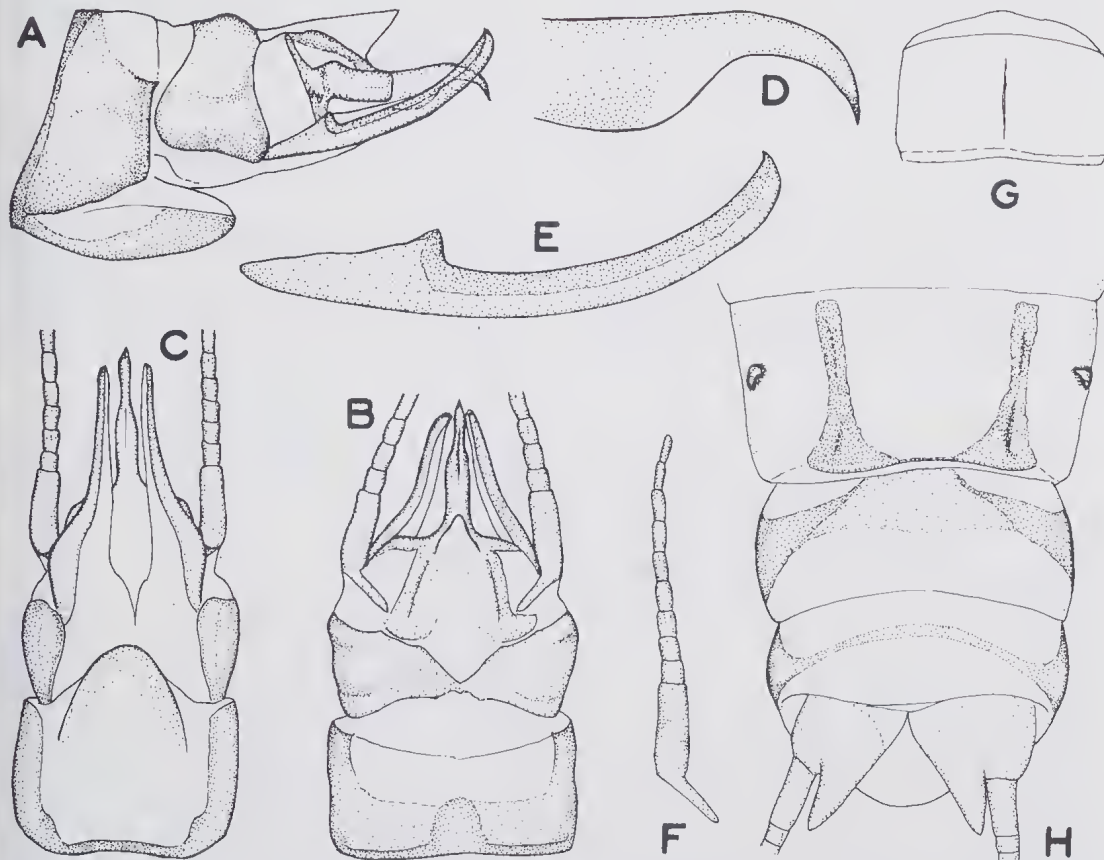


FIG. 7. *Dinotoperla dolichoprocta* sp.n.: A-F, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, lateral view; F, cercus, dorsal view; G, H, female: G, pronotum, dorsal view; H, genitalia, ventral view.

6.x.1965, A.S. Smithers; 1 ♂, Royal N.P., 29.xi.1968, CNS; all in AM. 3 ♂, 2 ♀, creek between Royal N.P. and Bulli, 8.ix.1980, GT; 1 ♂, 5 ♀, Minnamurra Falls, 15.x.1980, GT; 1 ♀, Bundenoan, 4.xii.1980, GT; all in GT.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-8.0	7.5-9.0
♀	8.5-10.5	8.5-10.0

Body variably yellowish to dark reddish brown. Wings slightly suffused with pale yellowish brown, markedly darker in pterostigma area and around distal crossveins in forewing.

MALE GENITALIA (A-F): Central sclerite of tergite X narrow, produced posteriorly into a well developed membranous cone. Epiproct slightly arched, a blade-shaped hook with strongly swollen base. Paraprocts with long and very narrow base, otherwise slightly curved dorsad with very small hardly upturned apical tip. Cerci slender, 9-11 segmented; basal segment long.

FEMALE GENITALIA (G-H): Subgenital plate wide, very slightly bilobed. Posterior margin of tergite X rounded. Cerci 9-11 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla dolichoprocta* sp.n. is very similar to *D. pseudodolichoprocta* sp.n. Diagnostic characters of *D. dolichoprocta* are a comparatively short and wide prothorax in both sexes, a narrow central sclerite of tergite X, a strong based epiproct, the narrow based paraprocts and a long basal cercus segment in male and a rounded hindmargin of tergite X in female.

DISTRIBUTION: There is material of *Dinotoperla dolichoprocta* sp.n. from Brown Mountain southeast of Canberra and from coastal New South Wales near Sydney but also from the Blue Mountains. Sympatrical *Dinotoperla* species: *D. carpenteri* Tillyard, *D. fontana* Kimmins, *D. pseudodolichoprocta* sp.n., *D. serricauda* Kimmins.

DINOTOPERLA DUPLEX, sp.n. (Fig. 4 A-C)

MATERIAL. Queensland: holotype ♂ and 5 paratypes (3 ♂, 2 ♀), Lamington N.P., O'R, 7.vii.1955, ICY, holotype (T.8512) and 1 paratype (♀) (T.8513) in QM, others in UQ. 1 ♂, labelled 2K1, and 1 ♂, 2 ♀, labelled 2A6, locality, date and collector unknown; in UQ, 2 ♂, Lamington N.P., Picnic Rk, 2/6.v.1956, ICY; 1 ♂ in UQ, 1 ♂ in GT.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	8.0-10.0	12.5-13.0
♀	8.0-10.5	14.5-15.5

Though all available specimens are young and therefore rather pale in colour they have already additional black markings on head and pronotum. Wings suffused with greyish yellow without darker patches (young specimens).

MALE GENITALIA (A,B): Central sclerite of tergite X produced only slightly posteriorly, forming a wide slightly downcurved obtuse membranous hummock. Epiproct streamlined with longer strongly downcurved pointed apical and shorter obtuse subapical spur, only a short distance between apex and ventral enlargement. Paraprocts with short wide base, otherwise strong, long, bent dorsad and slightly widened ventrally at about half length, apex not pointed. Cerci with 14-16 segments, basal segment of medium length.

FEMALE GENITALIA (C): Subgenital plate with posterior margin almost straight. Paraprocts subtriangular short and very wide. Hindmargin of tergite X rounded. Cerci 14 segmented.

AFFINITIES AND DIAGNOSIS: This large species is similar and possibly closely related to *Dinotoperla uniformis* Kimmins which ranges from at least southern New South Wales to southern Queensland. The bulky membranous hummock of tergite X, the ventrally bulging epiproct and the distinctively bent, strong paraprocts of the male and the very short and wide paraprocts of the female are specific characters of *D. duplex* sp.n.

DISTRIBUTION: The species is hitherto known from Lamington National Park only. Species found sympatric with *D. duplex* sp.n.: *D. carpenteri* Tillyard, *D. cobra* sp.n. and *D. fasciata* Kimmins.

DINOTOPERLA EUCUMBENE McLellan, 1971

As McLellan (1971) had regarded a male and a female of *Dinotoperla* with mottled wings, collected on the same day at Eucumbene River, New South Wales, as two different species — the male (*D. hirsuta*) was described as having scattered hairs on the abdomen, the female (*D. eucumbene*) not — Hynes (1974) concluded that McLellan had overlooked the abdominal hairs on that female, and regarded *D. hirsuta* McLellan a junior synonym of *D. eucumbene* McLellan by page priority. A study of the holotype of *D. eucumbene*, however, showed that it does in fact not have the scattered hairs peculiar to *D. hirsuta*,

but corresponds completely — as almost can be seen from a comparison of Figs 27A and 28A in McLellan (1971) with Fig. 14 left in Hynes (1974) — with *D. arenaria* Hynes. The two peculiarities of *D. eucumbene* as opposed to the description of *D. arenaria*, C–R crossveins and 8 cercal segments, are not unusual in a fine series of both sexes from Kiandra otherwise without any doubt matching Hynes' (1974) description of *D. arenaria*.

Thus *D. hirsuta* is not as Hynes (1974) reckoned a junior synonym of *D. eucumbene* but a quite distinct species. *D. arenaria* Hynes, however, must be regarded as conspecific with and a junior synonym of *D. eucumbene* (syn.n.). While McLellan (1971) could only give a description of a rather young female of *D. eucumbene*, Hynes (1974) described adult male and younger and older females all under *D. arenaria*.

DINOTOPERLA EUNGELLA, sp.n. (Fig. 8 A–F)

MATERIAL. Queensland: holotype ♂ and 15 paratypes (7♂, 8♀), Eungella Ra., Broken R., The Rapids, 2000ft, 27.vii.1956, TEW; holotype (T.8514) and 1 paratype (♀) (T.8515) in QM, 12 paratypes (6♂, 6♀) in UQ, 2 paratypes (1♂, 1♀) in GT. 7 paratypes (5♂, 2♀), Eungella Ra., Broken R., 17.vi.1955, A. May; 2 paratypes (♂), Eungella N.P., Broken R., 4/5.viii.1968, TW; 1♂, Finch Hatton Gorge, 19.iv.1968, GBM; all in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	7.0–8.0	9.5–10.5
♀	8.0–9.5	10.0–12.0

Body of the young specimens pale brownish yellow to brown with indication of usual dark markings. Wings with slight suffusion of pale brownish yellow.

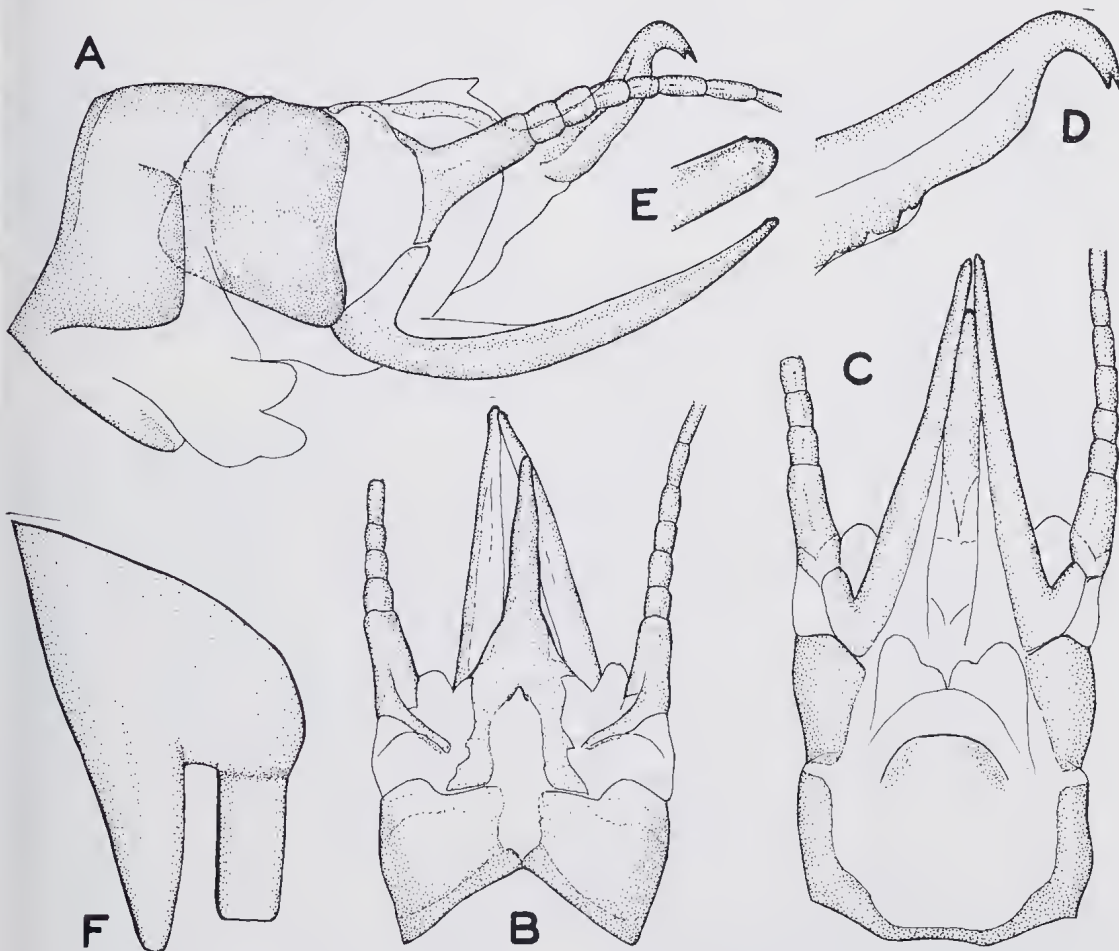


FIG. 8. *Dinotoperla eungella* sp.n.: A–E, male: A–C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view; F, female, paraproct and cercus base, ventral view.

MALE GENITALIA (A-E): Central sclerite of tergite X produced posteriorly in form of a little tip only. Epiproct tapered in dorsal view, a strong, well-rounded hook with comparatively slim end and a longer apical and a shorter subapical spur directed ventrad. Paraprocts with wide but extremely short base, otherwise very long, slim and slightly bowed dorsad, bearing a very small subterminal dorsal tooth. Cerci 10-11 segmented, basal segment long, appearing conical in lateral view.

FEMALE GENITALIA (F): All available females supposedly belonging to this species are teneral. Their subgenital plates are not at all sclerotized. The hind margin of tergite X is rounded. The apex of the paraprocts is straight and narrow and appears longer than in other *Dinotoperla* species. Cerci with 10-11 segments.

AFFINITIES AND DIAGNOSIS: *Dinotoperla eungella* sp.n. is similar to *D. bunya* sp.n. from Bunya Mountains and Cunninghams Gap. Males of *D. eungella* can be distinguished from this and all other *Dinotoperla* by their very long tergite IX, very small central sclerite of tergite X, the particular tapered epiproct and the short based, slightly arched, slender, tapered and subterminally toothed paraprocts.

DISTRIBUTION: The species is hitherto known only from the Eungella Range, where it coexists with one other *Dinotoperla* which I, having seen only a few very teneral specimens, include provisionally in *D. parabrevipennis* sp.n.

DINOTOPERLA FASCIATA Tillyard, 1924
(Fig. 9 A-E)

Only the female of this species was described by Tillyard (1924). Kimmins (1951) repeated and complemented Tillyard's description and illustrated what was left of the wings of the holotype. Hynes (1974) suspected that *D. fasciata* may be a synonym of *D. serricauda* Kimmins. The male can now be described from a large series of *D. fasciata* from many localities in Queensland and New South Wales.

MATERIAL. Queensland: Lamington N.P.: 1♀, 27.v.1955, A. Gardner; 2♂, 15.xi.1955, ICY; 1♂, Tooloona, 5.v.1956, ICY; 2♂, 23.v.1957, ICY; 1♂, 1♀, Lower Morans, 25.x.1957; 3♂, 2♀, Picnic Rk, 26.x.1957, ICY; 1♂, 1♀, Upper Coomera R., 27.v.1959, C. Cassidy; 1♀, 23.v.1962, M. Lyndon; 1♂, Upper Coomera R., 28.i.1963, GBM; 1♀, 20.v.1963, M.A. Koflick; 1♂, 10.ii.1964, GBM; 1♂, 17/21.v.1965, BKC; 1♂, 25.v.1966, TW; all in UQ. 2♂, Back Ck, near Landsborough, 10.iii.1962, K. Korboot; 1♂, Binna Burra, ?v.1961, P. McCarrol; 2♀, Binna Burra, 22.v.1962, E. Anderson; 1♀, Highvale, 14.iv.1962, D. Taylor; 2♂, 4♀, Killarney, 2.ix.1956, ICY; 1♀, Levers Plateau, 13.iii.1966, P. McFadyen; all in UQ. New South Wales: 2♂, Pt Lookout, via Ebor, Nothofagus Forest, 4500ft, 22.i.1967, BKC; in UQ. 1♂, 1♀, Wiangaree State Forest, via Kyogle, 18.ii.1974; SRM; in ANIC.

MALE: Measurements: Body 6.5-9.0 mm; forewing 7.5-9.5 mm.

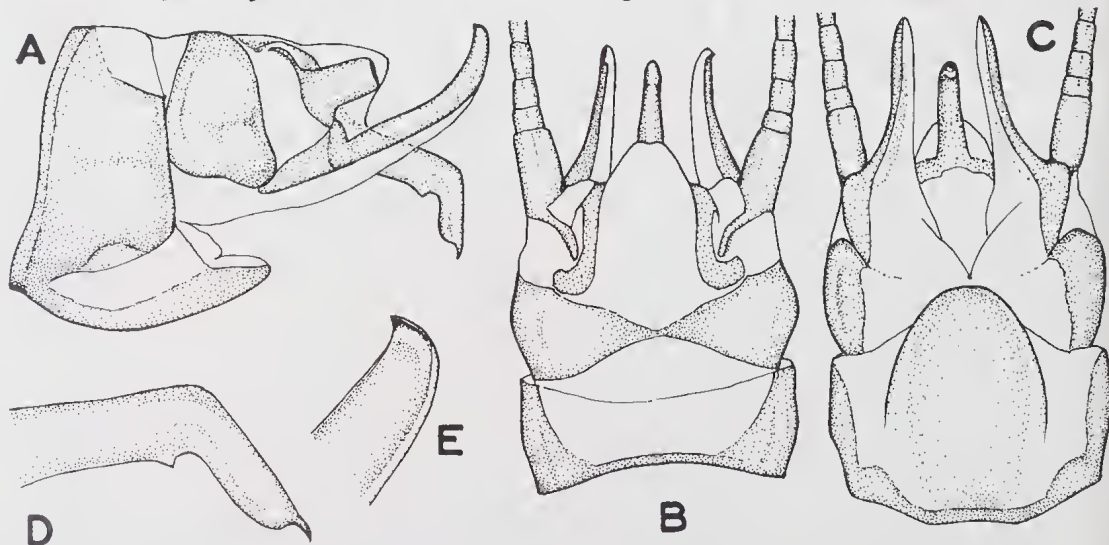


FIG. 9. *Dinotoperla fasciata* Kimmins, male: A-C, genitalia: A, lateral view, B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view.

Body and wings generally matching the description of the female by Tillyard (1924) and Kimmins (1951). Pronotum with well developed anterior corners. Legs darkened at knee.

GENITALIA (A-E): Central sclerite of tergite X produced posteriorly into a rather small obtuse slightly bilobed cone. Epiproct large, with apical half strongly bent ventrad and bearing an apical spur, a ventral tooth in basal half just proximal to angulation. Paraprocts with moderately long and rather narrow base, otherwise slim, with apical third bowed dorsad, tip acute and directed dorsolaterad. Cerci with 11-12 segments.

AFFINITIES AND DIAGNOSIS: *D. fasciata* is most similar to *D. christinae* McLellan. Diagnostic characters are the less pointed anterior corners of the pronotum in both sexes and the large, angulated, ventrally toothed epiproct of the male.

DISTRIBUTION: The species is known from southern Queensland and northern New South Wales. Other *Dinotoperla* species in its habitats are *D. arcuata* sp.n., *D. carpenteri* Tillyard, *D. cobra* sp.n., *D. duplex* sp.n., *D. fontana* Kimmins, *D. parabrevipennis* sp.n. and *D. uniformis* Kimmins.

DINOTOPERLA FONTANA Kimmins, 1951

Hynes (1974) synonymized *D. fontana* Kimmins with *D. serricauda* Kimmins but later (Hynes, 1976) admitted some doubt about his former concept of the variability of *D. serricauda*.

As can be seen from my discussions I regard *D. fontana* a proper species. *D. fontana* and *D. serricauda* often coexist in the same streams but — as Kimmins' descriptions and illustrations show — the male genitalia of the two species are entirely different.

DINOTOPERLA HIRSUTA McLellan, 1971

As pointed out above under *D. eucumbene* (q.v.) *D. hirsuta* cannot be regarded any longer as a junior synonym of *D. eucumbene* McLellan. *D. hirsuta* is a quite distinct species the female of which was well described by Hynes (1974) under *D. eucumbene*.

DINOTOPERLA KIRRAMA, sp.n. (Fig. 10 A-F)

MATERIAL. Holotype ♂ and 25 paratypes (19 ♂, 6 ♀), Queensland, Kirrama State Forest, via Cardwell, 17/18.viii.1966, GBM; holotype (T.8516) and 1 paratype (♀) (T.8517) in QM, 22 paratypes (18 ♂, 4 ♀) in UQ, 2 paratypes (1 ♂, 1 ♀) in GT.

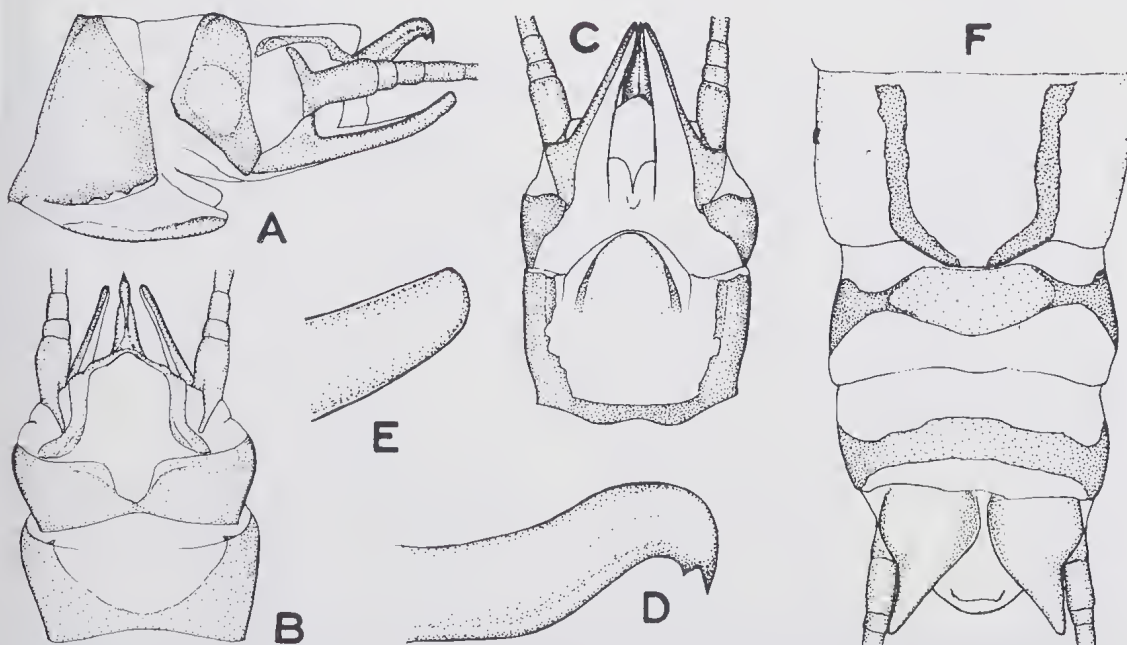


FIG. 10. *Dinotoperla kirrama* sp.n.: A-E, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view; F, female genitalia, ventral view.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	7.0-8.0	7.0-8.2
♀	9.5-10.5	9.0-10.5

Body dark yellowish to dark reddish brown. Wings largely hyaline with tint of yellowish brown, markedly darker between C and R and along distal crossveins of forewing.

MALE GENITALIA (A-E): Central sclerite of tergite X not produced posteriorly from lateral aspect. Epiproct tapered from dorsal aspect, a rather short simple well rounded hook with a small apical and generally with a very small subapical spur, both directed ventrad. Paraprocts with moderately wide and long base, otherwise narrow, almost parallel sided, unarmed. Subgenital plate narrowly oval. Cerci with 9-10 segments.

FEMALE GENITALIA (F): Subgenital plate produced medially, hockey-stick shaped dark

sclerotized area each side. Sclerotizations of sternites IX and X short, that of IX not strongly concave anteriorly. Paraprocts subconical, rather long. Tergite X rounded apically. Cerci 10-11 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla kirrama* sp.n. is, in my opinion, related to *D. brevipennis* Kimmins from Victoria and southern New South Wales and to *D. parabrevipennis* sp.n. from northern New South Wales. Distinguishing characters of *D. kirrama* are the tapered sides of tergite IX, the narrow subgenital plate and the simple paraprocts with their rounded tip in the male and the ventral sclerotizations of the terminal segments in the female.

DISTRIBUTION: *D. kirrama* is hitherto known only from the type locality, near Kirrama, in northern Queensland. Only one other *Dinotoperla* has ever been collected there: *D. cardaleae* sp.n.

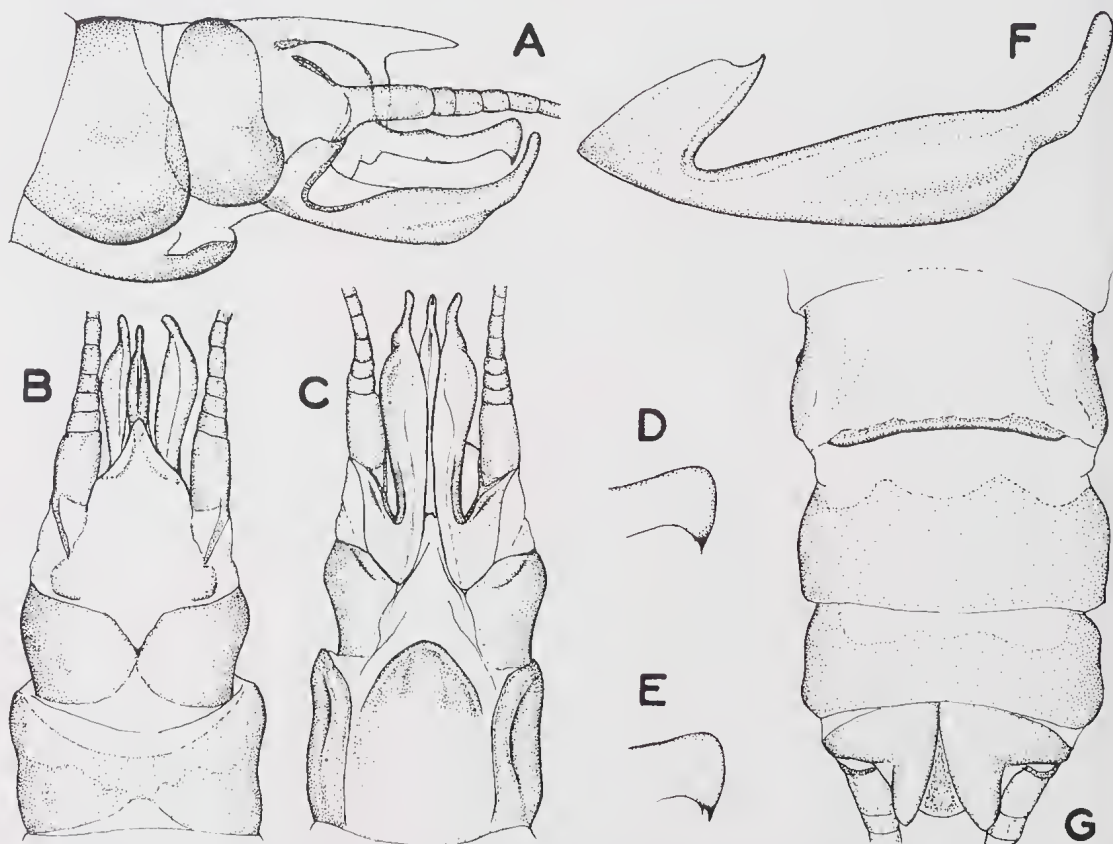


FIG. 11. *Dinotoperla leonardi* sp.n.: A-F, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, tip of epiproct of holotype, lateral view; E, tip of epiproct of specimen from Wollondilly River, lateral view; F, paraproct, lateral view; G, female genitalia, ventral view.

DINOTOPERLA LEONARDI, sp.n. (Fig. 11 A-G)

MATERIAL. New South Wales: holotype ♂ and 1 paratype (♀), Barrington Tops, Allyn R., 1/2.ix.1980, GT and LM; in ANIC. 1 paratype ♂, Barrington Tops, lower Allyn R., 18.x.1976, GT and LM; 2♂, Wollondilly R., nr Goodmans Ford, 6.x.1976, LM and GT; all in GT. Queensland: 1♂, Killarney, 23.ix.1956, collector unknown; in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-6.5	7.0-8.5
♀	8.5	10.7

Body variably yellowish grey to dark brown. Wings slightly suffused with pale greyish brown, somewhat darker between C and R and dark brownish grey patches around distal crossveins of forewing.

MALE GENITALIA (A-F): Central sclerite of tergite X strongly produced posteriorly from lateral aspect. Epiproct long and slender with ventrally directed, pointed apical spur, a small subapical spur may be present occasionally. Paraprocts narrowing abruptly from a short wide base, thence widening continuously to about two thirds length, narrowing again and bent dorsad in two steps, tip rounded. Cerci with rather long basal segment, 9-10 segmented.

FEMALE GENITALIA (G): In the single available young specimen which is probably conspecific with the holotype only the sclerotized apical margin of a remarkably wide subgenital plate seems to be of diagnostic value. Cerci with 11 segments.

AFFINITIES AND DIAGNOSIS: *Dinotoperla leonardi* sp.n. is most similar and probably closest related to *D. fontana* Kimmins. The male of *D. leonardi* can be distinguished from *D. fontana* and other *Dinotoperla* by its long, slender epiproct which is not markedly widened dorsally and by the long sinuous, double bent, round-tipped paraprocts.

DISTRIBUTION: The species is fairly widespread, its known range extending from the Wollondilly River (New South Wales) in the south to Killarney (southern Queensland) in the north. *Dinotoperla* species found sympatrical with *D. leonardi* sp.n. are: *D. fasciata* Kimmins, *D. fontana* Kimmins, *D. serricauda* Kimmins and *D. uniformis* Kimmins.

DINOTOPERLA PARABREVIPENNIS, sp.n. (Fig. 12 A-F)

MATERIAL. New South Wales: holotype ♂ and 5 paratypes (2 ♂, 3 ♀), New England N.P., 21.ii.1966, EFR; holotype and 3 paratypes (1 ♂, 2

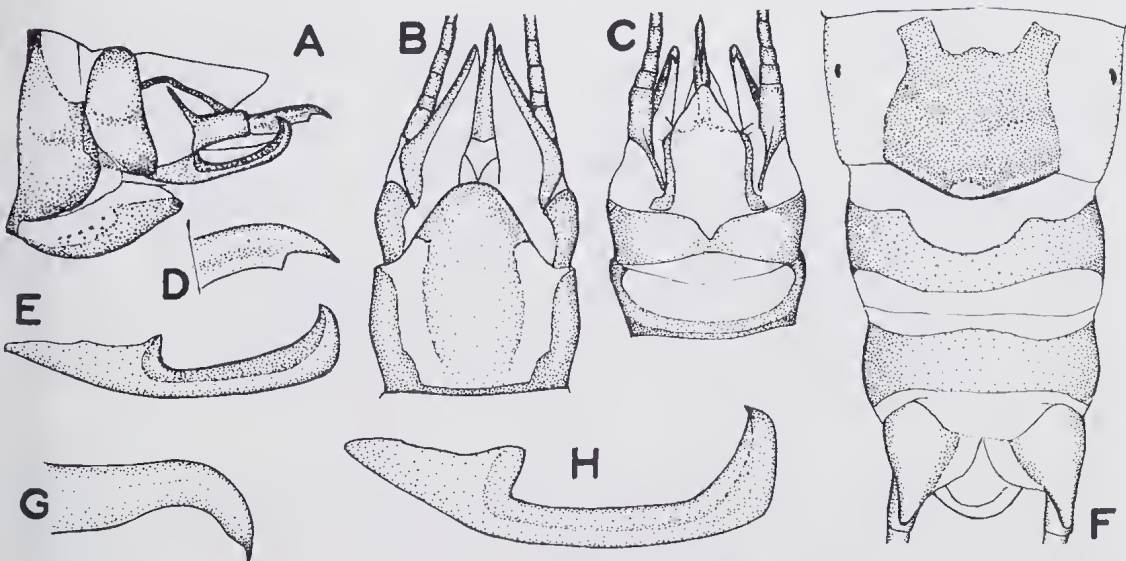


FIG. 12. A-F, *Dinotoperla parabrevipennis* sp.n.: A-E male: A-C, genitalia: A, lateral view; B, ventral view; C, dorsal view; D, tip of epiproct, lateral view; E, paraproct, lateral view; F, female genitalia, ventral view. G, H, *Dinotoperla parabrevipennis* sp.n., male, from Eungella Range: G, epiproct, lateral view; H, paraproct, lateral view.

♀), in ANIC, 2 paratypes (1 ♂, 1 ♀) in GT. 5 paratypes (1 ♂, 4 ♀), New England N.P., Pt Lookout, 21.iv.1960 and 3 paratypes (2 ♂, 1 ♀), same locality, 16.i.1964, C.W. Frazier; all in UNE. 9 paratypes (4 ♂, 5 ♀), New England N.P. 4.i.1966, CNS; 1 ♂, 3 ♀, Barrington Tops, Gummi Falls, Rain Forest, 30.xii.1961, C.N. and A.S. Smithers; all in AM.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-7.5	6.5-8.5
♀	7.5-9.0	8.0-9.0

Body yellowish to dark brown. Wings faintly suffused with yellowish grey, conspicuous brown patches around distal crossveins of forewing.

MALE GENITALIA (A-E): Central sclerite of tergite X produced posteriorly into a substantial cone. Epiproct narrow, slightly but evenly arched ventrad for its whole length, with pointed apical spur, directed posteriorly rather than ventrally, and obtuse subapical tooth some distance from apex. Paraprocts with moderately long and wide base, otherwise short, rather widening towards the end, slightly arched dorsad, with pointed apex, curved to the anterior. Cerci with 8-9 segments.

FEMALE GENITALIA (F): Subgenital plate broadly darkened and sclerotized, produced medially but not angulated. Sclerotizations of sternite IX and X moderately long, that of IX with semicircular median excision anteriorly. Paraprocts conical, short. Cerci 8-9 segmented. Tergite X with rounded tip.

AFFINITIES AND DIAGNOSIS: *Dinotoperla parabrevipennis* sp.n. is considered closely related to *D. brevipennis* Kimmins from Victoria and southern New South Wales and to *D. kirrama* sp.n. from northern Queensland. *D. parabrevipennis* is distinguishable from its allies by the conical central sclerite of tergite X, the very slightly arched epiproct with obtuse distantly subapical tooth and the upturned pointed end of the paraprocts in male. The female stands out by a convex posterior margin of the subgenital plate and the semicircular median excision of the sclerotization of sternite IX.

DISTRIBUTION: The species is known from New England Range and from BarringtonTops, both in northern New South Wales. Some material from Eungella Ra. (4 very young ♂, Broken R., 4/5.viii.1968, T. Weir; in UQ) is provisionally placed here (Fig.12 G,H). *D. cobra* sp.n. has been found sympatrical with *D. parabrevipennis*.

DINOTOPERLA PSEUDODOLICHOPROCTA sp.n.
(Fig.13 A-G)

MATERIAL. New South Wales: holotype ♂ and 5 paratypes (4 ♂, 1 ♀), Blue Mountains, Wentworth Falls, 11.ix.1980, GT; holotype and 1 paratype (♀) in ANIC, 4 paratypes (♂) in GT. 3 paratypes (♂), Blue Mountains, 22.xi.1960, D.K. McAlpine; 1 paratype (♂), Blue Mountains, Wentworth Falls, 22.xi.1960, CNS; all in AM. 1 paratype (♀), Blue Mountains, Wentworth Falls, 15.xi.1980, GT; in GT.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-7.5	6.5-7.5
♀	6.5-8.0	6.5-7.5

Body yellowish to blackish brown, wings faintly suffused with greyish brown; dark greyish brown patches around distal crossveins of forewing.

MALE GENITALIA (A-D): Central sclerite of tergite X wide, produced posteriorly into a small membranous cone. Epiproct simple, slightly arched, blade-shaped. Paraprocts with moderately long and wide base, otherwise slightly curved dorsad, tip upturned. Cerci 13-16 segmented, basal segment very short.

FEMALE GENITALIA (F-G): Subgenital plate bilobed. Posterior margin of tergite X angulated. Cerci 12-15 segmented.

AFFINITES AND DIAGNOSIS: *Dinotoperla pseudodolichoprocta* sp.n. is most similar and probably closest related to *D. dolichoprocta* sp.n. The specific characters of *D. pseudodolichoprocta* are a rather long and narrow prothorax in both sexes, the basally wide central sclerite of tergite X and the many segmented, short based cerci in the male and the bilobed subgenital plate and the angulated hind margin of tergite X in the female.

DISTRIBUTION: *Dinotoperla pseudodolichoprocta* sp.n. is known only from the Blue Mountains in New South Wales, where it exists sympatrically with *D. carpenteri* Tillyard, *D. dolichoprocta* sp.n., *D. fontana* Kimmins and *D. serricauda* Kimmins.

DINOTOPERLA SCHNEIDERAE sp.n. (Fig. 14 A-E)

MATERIAL. Queensland: holotype ♂ and 1 paratype (♂), Mt Mee, ?i.1971, SRM; holotype in QM (T.8518), paratype in UQ. ?1♂, Cunningham's Gap, 17.iii.1956, ICY; in UQ.

MALE: Measurements: Body 7.5-8.0 mm; forewing 8.0-8.5 mm.

Body variably yellowish to dark brown. Wings with slight suffusion of pale brown, markedly darker in pterostigma area, along distal part of longitudinal veins and surrounding crossveins of forewing.

GENITALIA (A-E): Central sclerite of tergite X slightly sclerotized basally, produced posteriorly into a huge, more or less pointed membranous cone. Epiproct a large strongly bent hook with long pointed apical and short obtuse subapical spur, both directed ventrally, a few dorsal spines in basal half. Paraprocts with long base, otherwise rather short, bowed dorsad, sinuously widened dorsally in apical third, with pointed tip. Cerci 11-12 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla schneiderae* sp.n. is considered closely related only to *D. spinosa* sp.n. from Mt Tozer in northern Queensland. Its diagnostic characters are the spiny epiproct and the slender, subterminally widened, pointed paraprocts.

DISTRIBUTION: The species is hitherto known with certainty only from Mt Mee in southeastern Queensland, the record from Cunningham's Gap remains somewhat doubtful. On Mt Mee it was found sympatric with *D. arcuata* sp.n., at Cunningham's Gap the two other species were *D. arcuata* sp.n. and *D. bunya* sp.n.

DINOTOPERLA SPINOSA, sp.n. (Fig. 14 F, G)

MATERIAL. Holotype ♂, Queensland, Iron Ra., Mt Tozer, 300 m, 30.iv.1973, SRM; in ANIC.

MALE: Measurements: Body 5.0 mm; forewings with distal portion missing. Body and wings of the unique male (very young) pale greyish yellow.

GENITALIA (F, G): Central sclerite of tergite X a huge pointed membranous cone. Epiproct a large hook with apical part slightly arched, very thin and narrow; a long pointed apical and a shorter subapical spur; base with several dorsal spines. Paraprocts strong, distinctively excavated on outer

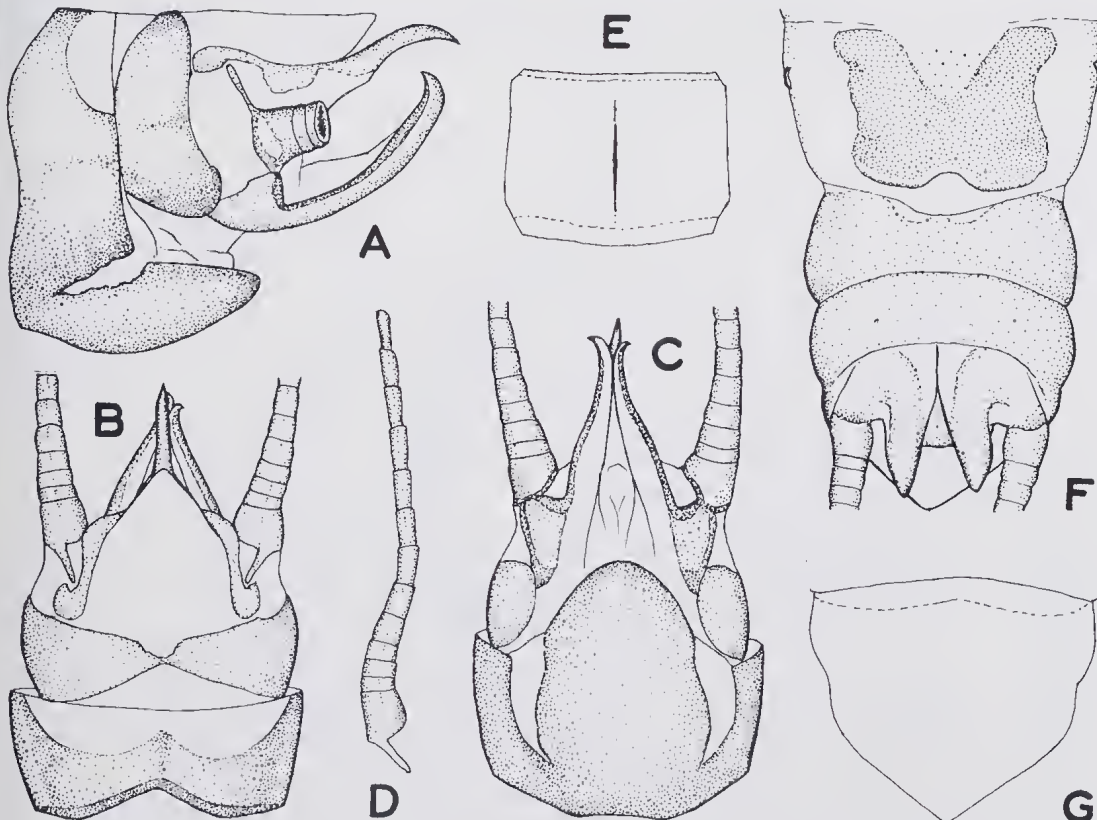


FIG. 13. *Dinotoperla pseudodolichoprocta* sp.n.: A-D, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, cercus, dorsal view; E-G, female: E, pronotum, dorsal view; F, genitalia, ventral view; G, tergite X, dorsal view.

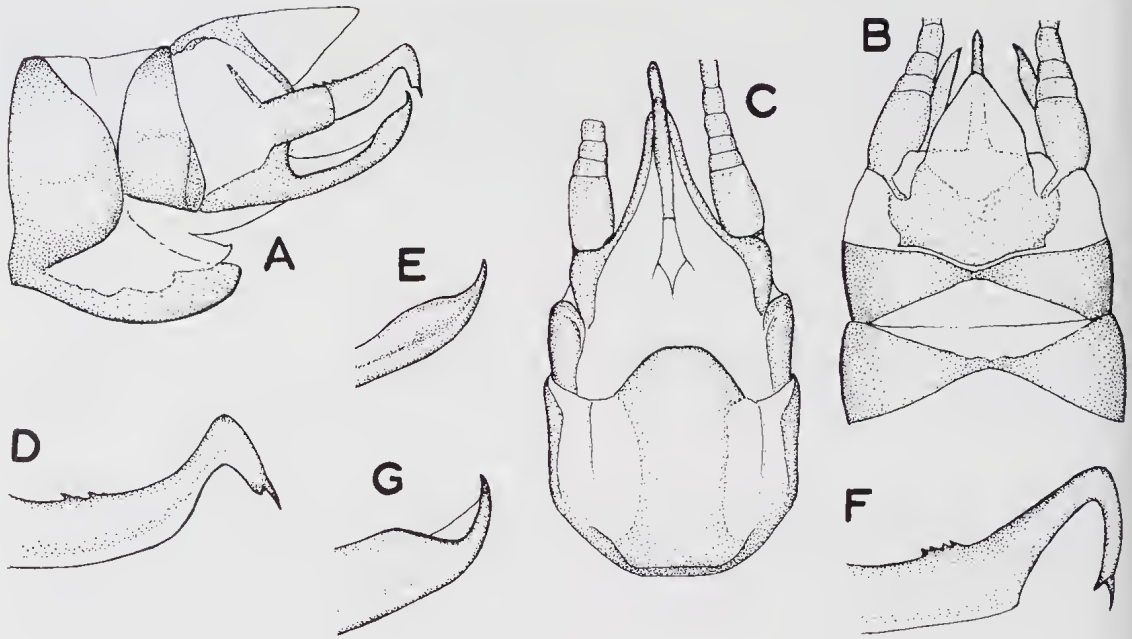


FIG. 14. A-E, *Dinotoperla schneiderae* sp.n., male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view. F, G, *Dinotoperla spinosa* sp.n., male: F, epiproct, lateral view; G, tip of paraproct, lateral view.

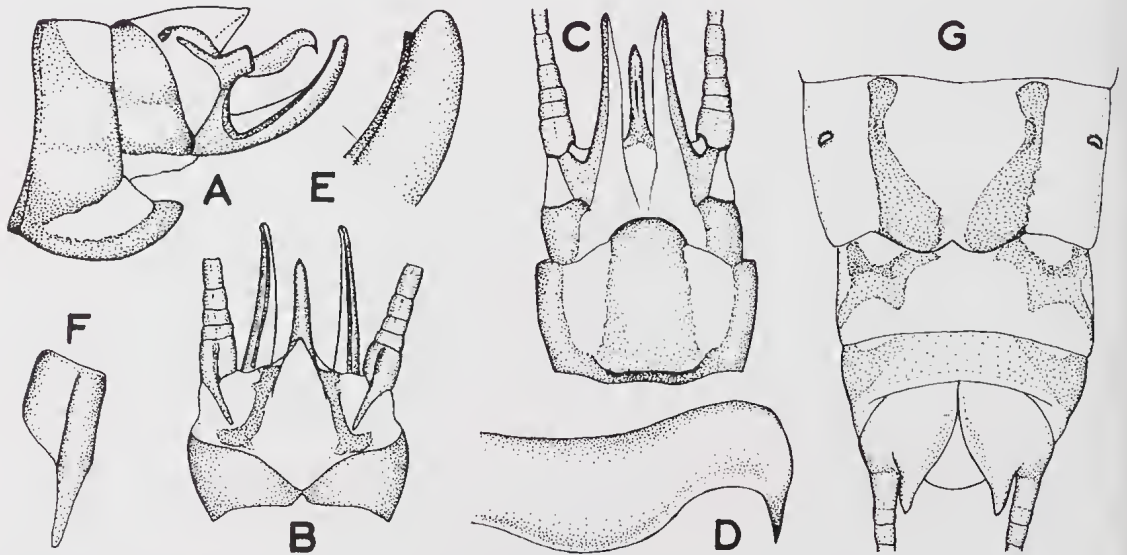


FIG. 15. *Dinotoperla vulcanica* sp.n.: A-F, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view; F, basal cercus segment, dorsal view; G, female genitalia, ventral view.

side adjacent to strongly upturned tip. Cerci with 13 segments.

AFFINITIES AND DIAGNOSIS: *Dinotoperla spinosa* sp.n. is considered closely related to *D. schneiderae* sp.n. from Queensland. Diagnostic characters of *D. spinosa* are the unusual prolongation of the apical part of the epiproct and the laterally excavated paraprocts.

DISTRIBUTION: The species is known at the present only from the type locality (Mt Tozer). No other *Dinotoperla* have been reported there.

DINOTOPERLA UNIFORMIS Kimmins, 1951

Hynes (1974) considered *D. uniformis* Kimmins a junior synonym of *D. serricauda* Kimmins but later (Hynes, 1976) expressed some doubt about his former concept of the variability of *D. serricauda*. As my discussions show I regard *D. uniformis* a proper species. *D. uniformis* often coexists with *D. serricauda* and as Kimmins' (1951) descriptions and illustrations clearly demonstrate the male genitalia of the two species are strikingly different.

DINOTOPERLA VULCANICA, sp.n. (Fig. 15 A-G)

MATERIAL. Queensland: holotype ♂ and 2 paratypes (1 ♂, 1 ♀), The Crater, Atherton Tableland, 25.iv.1970, S.R. Curtis; holotype and 1 paratype (♀) in ANIC, 1 paratype (♂) in GT. 2 paratypes (♂), The Crater, nr Herberton, 18.xii.1974, M.S. Moulds; in AM.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	6.0-7.0	7.0-8.5
♀	9.2	9.5

Body yellowish to dark brown. Wings suffused with pale yellowish brown, considerably darkened between C and R, particularly in pterostigma area and around all crossveins of forewing.

MALE GENITALIA (A-F): Central sclerite of tergite X produced posteriorly into a substantial membranous cone. Epiproct simple, slightly S-curved with birdshead-shaped apex. Paraprocts with short wide base, otherwise slightly arched dorsad and very slightly narrowing towards apex which is well rounded and armed with a very small subapical dorsal tooth. Cerci with very short longitudinally strengthened basal segment, 9-10 segmented.

FEMALE GENITALIA (G): Subgenital plate produced onto sternite IX, narrow, bilobed. Sclerotization on sternite IX interrupted medially. Paraprocts with narrow and rather pointed apex. Posterior margin of tergite X rounded. Cerci 10 segmented.

AFFINITIES AND DIAGNOSIS: *Dinotoperla vulcanica* sp.n. is probably related to *D. arcuata* sp.n. from southeastern Queensland and north eastern New South Wales, *D. wanungra* sp.n. from Lamington N.P., and to *D. carnarvonensis* sp.n. from Carnarvon Range. Diagnostic characters of male *D. vulcanica* are short paraprocts with simple base, a long sinuous epiproct, a rather short first cercus segment and a basal cercus sclerite of normal shape (not overdeveloped as in the three species mentioned).

DISTRIBUTION: *Dinotoperla vulcanica* sp.n. appears to be an endemic *Dinotoperla* of Crater National Park in Atherton Tableland; it coexists there with *D. cardaleae* sp.n.

DINOTOPERLA WANUNGRA, sp.n. (Fig. 16 A-E)

MATERIAL. Holotype ♂, Queensland, Lamington National Park, Mt Wanungra, 15.vi.1963, GBM; in QM (T.8519).

MALE: Measurements: Body 10.0 mm, forewing 9.5 mm.

Body in the single available and discoloured specimen yellowish grey. Wings without distinctive pattern.

GENITALIA (A-E): Central sclerite of tergite X produced posteriorly into a long substantial membranous cone. Epiproct long, spearhead-shaped as seen from above, keeled ventrally, for the second third of its length, with downcurved pointed apical and obtuse subapical spur and a distinctive M-shaped dorsal tooth about one third length from base. Paraprocts with very wide and short base, otherwise long and straight, with apical quarter strongly bent dorsally and apex enlarged with small apical spine-shaped process directed to the anterior. Cerci with long, well developed basal segment, 16-segmented.

AFFINITIES AND DIAGNOSIS: The long basal cercus segment and the overall shape of paraprocts and epiproct suggest that *D. wanungra* sp.n. is closely allied to *D. arcuata* sp.n. Apart from much greater longitudinal dimensions of all genital structures the markedly upturned and enlarged tips of the paraprocts and the dorsal tooth on the epiproct clearly separate *D. wanungra* from this species.

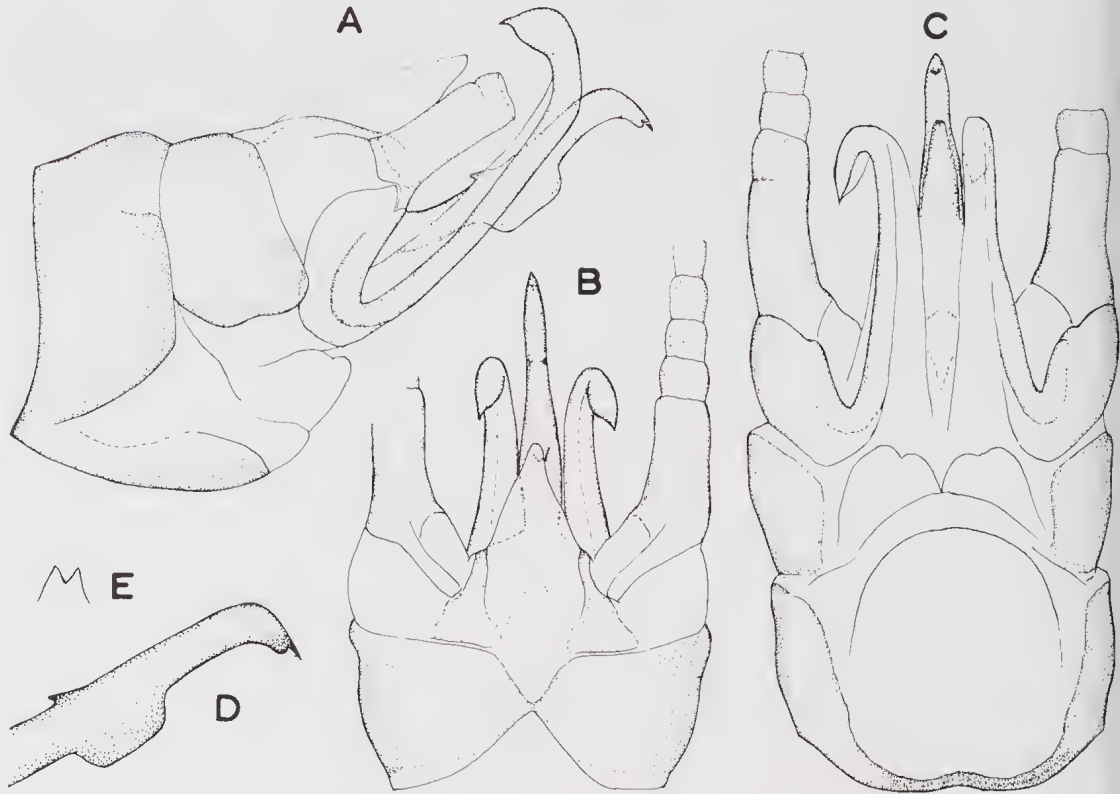


FIG. 16. *Dinotoperla wanungra* sp.n., male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, basal tooth of epiproct, dorsal view.

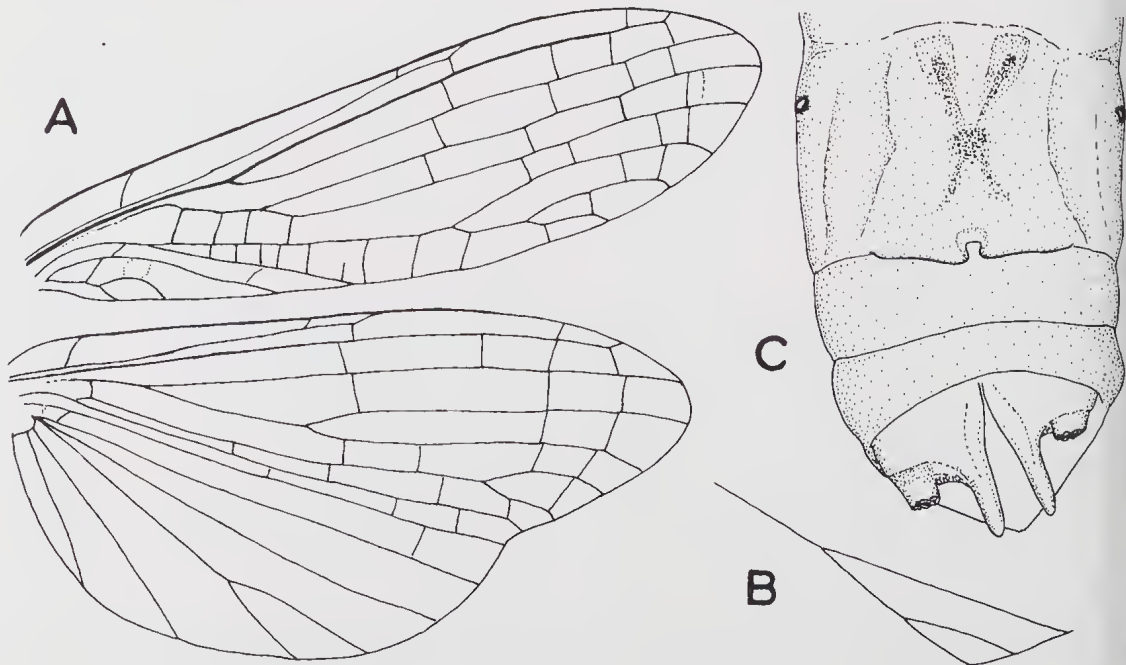


FIG. 17. *Dundundra baiame* sp.n., female: A, wings; B, triple branched 4A; C, genitalia, ventral view.

DISTRIBUTION: The species has hitherto only been collected on Mt Wanungra in Lamington National Park. Several other *Dinotoperla* species are known from the same National Park: *D. carpenteri* Tillyard, *D. cobra* sp.n., *D. duplex* sp.n., *D. fasciata* Tillyard.

DUNDUNDRA, gen.n.

TYPE SPECIES: *Dundundra baiame*, sp.n., by monotypy.

CHARACTERS: Wings unusually broad, with well visible but somewhat variable pattern. Forewing with Rs simple, M forked and Cul triple branched. Hindwing with Rs simple, M forked, but M3+4 never fused with Cul; Cul forked; 4A forked or triple branched; 6A free of wing margin.

FEMALE GENITALIA: Subgenital plate not produced; with small deep and almost circular narrow median notch. Paraprocts with very narrow apex. Hind margin of tergite X angulated. Cerci with 14–16 segments.

AFFINITIES AND DIAGNOSIS: In wing venation (M3+4 never fused with Cul in hindwing) and structure of female subgenital plate (with narrow median notch) *Dundundra* clearly stands out from all known Dinotoperlinae and even Gripopterygidae. The question if *Dundundra* is a sister group of a single genus (perhaps *Dinotoperla*) a group of closely related genera (perhaps *Dinotoperla*, *Neboissoperla* and *Nesciooperla*) or of the higher taxa mentioned above cannot be answered before the male of *Dundundra* is discovered.

DUNDUNDRA BAIAME, sp.n. (FIG. 17A–C)

MATERIAL. Queensland: Holotype ♀ and 1 paratype (♀), Lamington N.P., 30.v.1929, FAP, and 3 paratypes (♀), same locality, 30.v.1935, collector unknown but probably also Perkins; holotype in QM (T.8520), 3 paratypes in UQ, 1 paratype in GT.

FEMALE: Measurements: Body 10.0–11.5 mm; forewing 11.0–12.5 mm.

Body rather stout, variably light greyish to dark reddish brown. Antennae markedly longer than forewing. Legs long and strong, darkened for a longer distance in femora, for a shorter distance in tibiae at knees.

Wings (A, B) described under "Characters" of *Dundundra*; 3–8 crossveins in all cells between Rs and Cula; membrane greyish white with

conspicuous greyish brown patches on distal crossveins in forewing, tinted largely with greyish brown all over in hindwing.

GENITALIA (C) described under "Characters" of *Dundundra*.

AFFINITIES AND DIAGNOSIS discussed under *Dundundra*.

DISTRIBUTION: Hitherto known from the type locality, Lamington N.P., only.

NEBOISSOPERLA MONTEITHI, sp.n. (FIG. 18 A–F)

MATERIAL. Holotype ♂, New South Wales, Williams R., Rocky Crossing, via Salisbury, 27.v.1963, GBM; in QM (T.8521).

MALE: Measurements: Body 7.5 mm; forewing 9.0 mm.

Body including legs in the single available young and discoloured specimen pale yellowish brown without any conspicuous markings. Wings almost hyaline; 2–4 distal crossveins in all spaces between Rs and Cula of forewing.

GENITALIA (A–F): Central sclerite of tergite X produced posteriorly into a thumb-shaped membranous lobe. Epiproct with anterior spur curved posteriorly and posterior spur curved ventrally. Paraprocts evenly bulged ventrally and slightly concave dorsally, with laterally strongly developed base and rectangular subapical dorsal tooth directed to the anterior. Cerci with the three basal segments enlarged, 17 segmented.

AFFINITIES AND DIAGNOSIS: *Neboissoperla monteithi* sp.n. is similar and closely related to the other known *Neboissoperla*, *alpina* McLellan, from some mountainous areas of Victoria and south eastern New South Wales. While the epiproct of these two species is almost identical in shape, the paraprocts are much less bulged ventrally and less sclerotized, with a tooth pointing in the opposite direction (to the anterior), the basal cercus segment is not at all long or curved and the next cercal segments lack dorsal projections in *N. monteithi*. By the inclusion of this new species *Neboissoperla* McLellan is taken closer to *Dinotoperla* Tillyard than when considered monotypic.

NESCIOOPERLA, gen.n.

TYPE SPECIES: *Nesciooperla curtisae*, sp.n., by monotypy.

CHARACTERS: Wings without pattern; forewing with Rs simple, Cul forked, only 1 distal crossvein in each cell between Rs and Cula; cubitoanal space with indication of 1 basal crossvein; hindwing with Rs simple, M3+4 and Cu1 separating before wing margin; generally 1 crossvein between Cu1 and Cu2.

MALE GENITALIA: Central sclerite of tergite X produced posteriorly into a very long, narrow, apically rounded and largely membranous process. Epiproct very large, a strongly angulated hook-like structure with one dorsal spur directed anteriorly and two apical spurs directed ventrad, the posterior spur being shorter than the anterior. Paraprocts very strongly developed, with long wide base, thence very narrow but widening continuously again to form a sub-apical ventral corner and a dorsad directed pointed apex. Cerci with 14 segments. A significant rounded ear-shaped, strongly sclerotized plate is situated at the inner side of each cercus base.

FEMALE GENITALIA: Subgenital plate with hind margin slightly emarginate medially. Paraprocts short, appearing wider than long in ventral view, obtuse. Hindmargin of tergite X rounded. Cerci 12-13 segmented.

AFFINITIES AND DIAGNOSIS: As indicated by the wing venation *Nesciopterla* gen.n. is certainly most closely related to *Dinotoperla* Tillyard and *Neboissoperla* McLellan. It has however, less distal cross-veins in forewing than is known from any species of these genera. The male genitalia do not match those of either *Dinotoperla* or *Neboissoperla* or any other genera. At the present we do not know of any *Dinotoperla* or *Neboissoperla* with an anteriorly directed dorsal spur and two ventrally directed terminal spurs on the epiproct of which the posterior is the shorter one. The ear-shaped structure between cercus base and epiproct is unique. The shape of the central sclerite of tergite X in male and the female genitalia of *Nesciopterla* appear more similar to

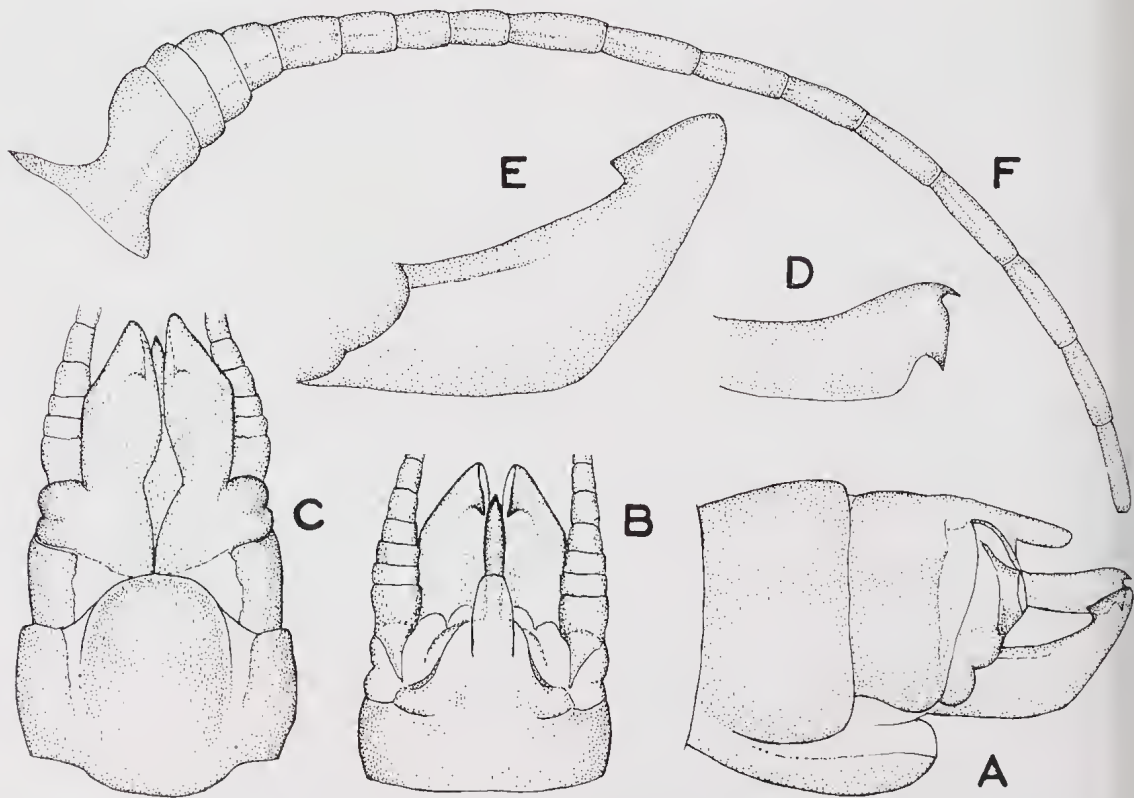


FIG. 18. *Neboissoperla monteithi* sp.n., male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, lateral view, F, cercus, lateral view.

these structures of *Neboissooperla* than to those of *Dinotoperla*, while the paraprocts of the male match perhaps closer those of *Dinotoperla*.

On the reasons of these similarities a sister group relationship between *Nesciooperla* and *Dinotoperla* — *Neboissooperla* could be taken into consideration.

NESCIOPERLA CURTISAE, sp.n. (Fig.19 A–F)

MATERIAL. Holotype ♂ and 1 paratype (♀), Queensland, Bloomfield R., 7/9.v.1970, S.R. Curtis; in ANIC.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	7.0	7.2
♀	8.0	8.0

Body brownish yellow to pale greyish brown with dark brown to black markings as follows: at base of all coxae, along anterolateral and ventrolateral edge of meso- and meta-thorax, along ventral edge of all femora; only slightly darkened at base of all tibiae. Wings with yellowish brown venation and very slightly pale brownish yellow suffused membrane without any pattern.

MALE GENITALIA (A–E) AND FEMALE GENITALIA (F) described under 'Characters' of *Nesciooperla*.

AFFINITIES AND DIAGNOSIS discussed under *Nesciooperla*.

DISTRIBUTION: *Nesciooperla curtisae* is known only from the type locality, Bloomfield R., on Cape York Peninsula.

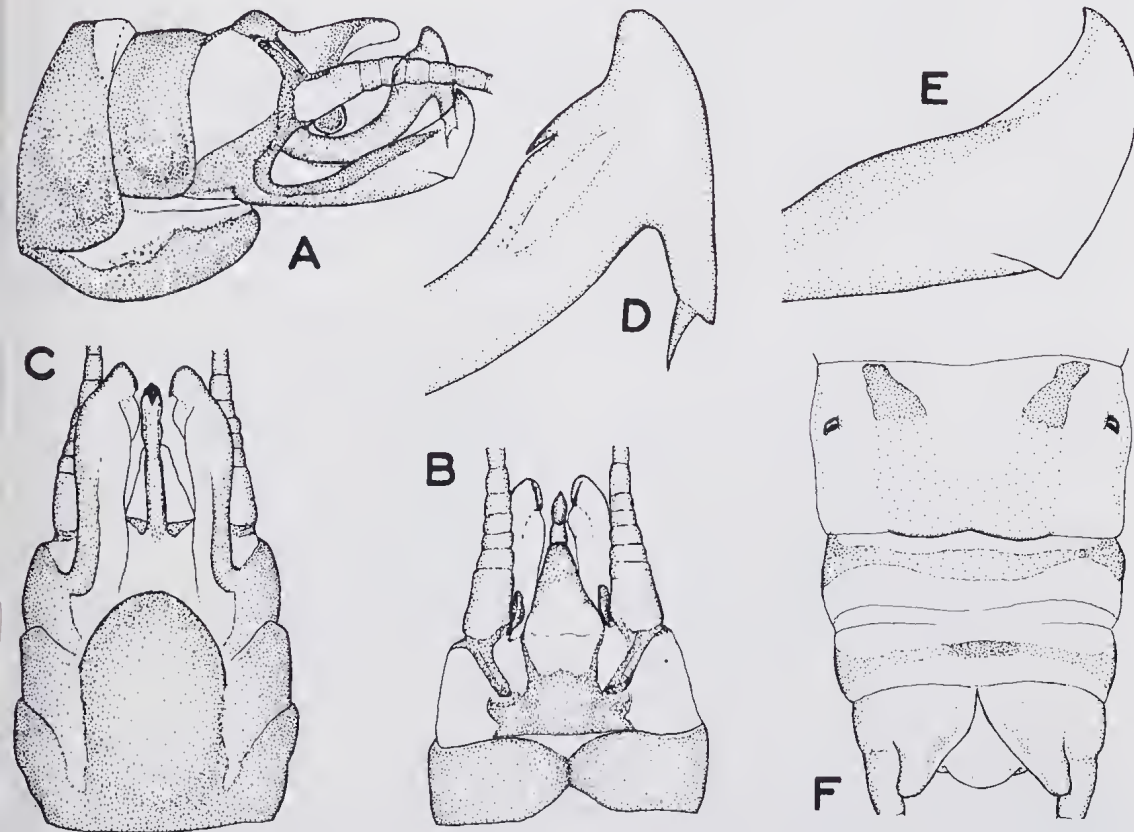


FIG. 19. *Nesciooperla curtisae* sp.n.: A–E, male: A–C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, tip of epiproct, lateral view; E, tip of paraproct, lateral view; F, female genitalia, ventral view.

ILLIESOPERLA AUSTRALIS (Tillyard, 1924)

Hynes (1974) synonymized *I. franzeni* (Perkins), *I. mayi* (Perkins), *I. perkinsi* McLellan and *I. tasmanica* McLellan with *I. australis*. There are, however, marked and clear morphological differences not only in the venation and in the shape of the epiproct but also in the form of the male paraprocts which indicate distinctness of *I. franzeni*, *I. mayi*, *I. perkinsi* and *I. tasmanica* from *I. australis* on specific level.

I. australis stands out within *Illiesoperla* by the presence of pterostigma crossveins in both sexes and by a high and narrow epiproct without any dorsal tooth and rather long slender slightly arched paraprocts with their sclerotization distinctively enlarged for a short distance near cercus base in male.

MATERIAL. New South Wales: 2 ♂, 22 ♀, Bolairo, 1961-74, EFR; 14 ♂, 11 ♀, Canberra, 1935-61, EFR; in ANIC. 2 ♂, 5 ♀, Wollondilly R., nr Goodmans Ford, 6.x.1976, LM and GT and 4 ♂, 3 ♀, same locality; 20/21.ix.1980, GT; in GT.

ILLIESOPERLA CERBERUS, sp.n. (Fig. 20A-H)

MATERIAL. Queensland: holotype ♂ and 1 paratype (♀), 40 km w. of Tully, 31.x.1971, EFR; 1 ♀, Kirrama State Forest (Western Fall), 30.v.1971, EFR; 1 ♂, Little Crystal Ck, Mt Spec, 29.v.1971, EFR; 5 ♀, Moses Ck, 4 km N. by E. Mt Finnigan, 15° 47' S/145° 17' E, 14/16.x.1980, J.C. Cardale; 1 ♂, Mossman Gorge, 16.vi.1971, EFR; 5 ♀, 2 km on Mt Edith Rd, Tinaroo Dam, 23.vi.1971, EFR; 1 ♀, Mulgrave River, date and collector unknown; all in ANIC. 1 ♂, The Crater nr Herberton, 18.xii.1974, M.S. Moulds; 1 ♂, 3 ♀, Whitfield Range, nr Cairns, 24.viii.1974, M.S. Moulds; all in AM. 1 ♂, 13 ♀, Mena Ck, nr Mt Utchee, 145° 52'/17° 40', 26/27.xi.1976, LM and GT; 3 ♀, Mossman Gorge, 145° 23'/26° 27', 19/25.xi.1976, LM and GT; all in GT. 1 ♂, Bloomfield R., 3.x.1974, GBM; 1 ♂, 15 nymphs, Mossman Gorge N.P., 10.viii.1968, TW; 1 ♀, Paluma Dam, 24.xii.1963, GMB; 2 ♂, 1 ♀, Upper Mulgrave R., 30.vi.1970, GBM; all in UQ. Palmerston N.P.: 5 ♀, 29.xii.1964, GBM; 2 ♂,

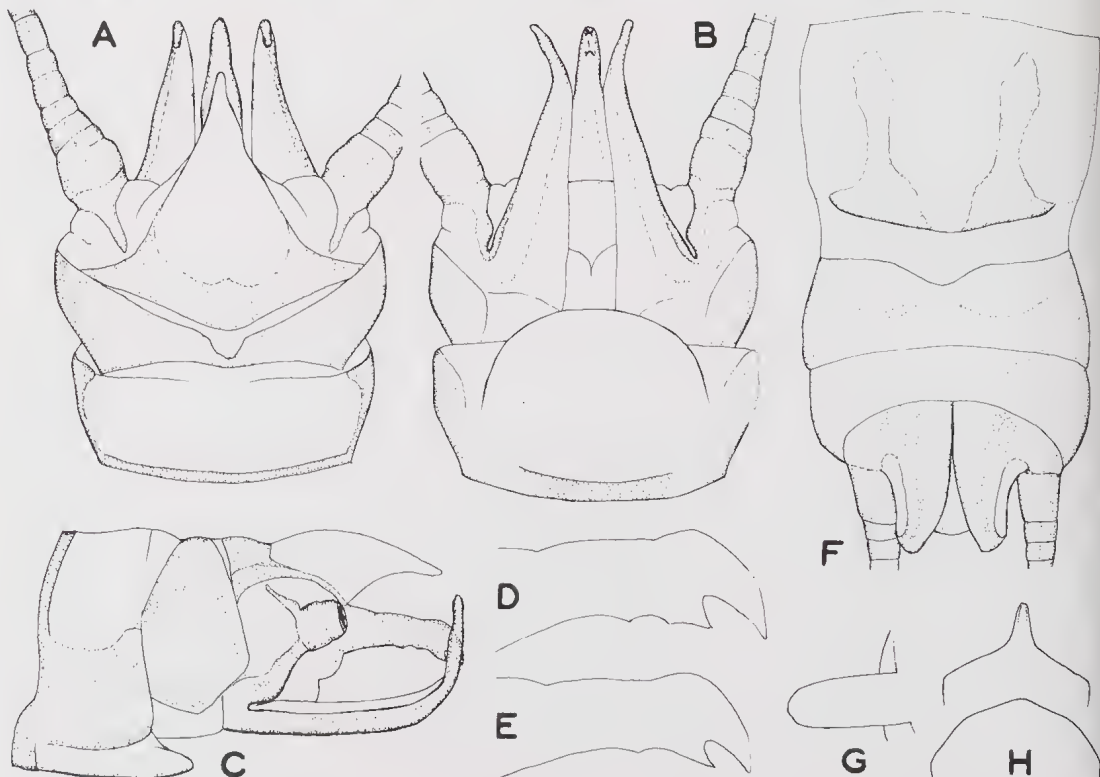


FIG. 20. *Illiesoperla cerberus* sp.n.: A-E, male: A-C, genitalia: A, dorsal view; B, ventral view; C, lateral view; D, E, epiproct, lateral view: D, from locus typicus; E, from Whitefield Range; F, female genitalia, ventral view; G, H, fully grown nymph: G, posterolateral corner of prosternum, ventral view; H, posterior margin of tergite X: top, male; bottom, female.

22.iv.1968, BKC; Henrietta Ck, 3 ♀, 5.xii.1965, GBM, and 2 ♂, 8.viii.1968, TW; via Innisfail, 1 ♀, 23.iv.1968, GBM; all in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	9.5–11.5	10.5–13.0
♀	12.5–14.5	12.0–14.0

Body largely greyish yellow to greyish brown, lighter mainly on ventral side of entire body and on inner side of femora; yellow pattern on head and on outer side of femora; two conspicuous black dots at base of meso- and meta-coxa, one black mark anteriorly on lateroventral edge of both meso- and meta-thorax. Prosternum with long, thin sausage-shaped posterolateral process. Wings, suffused faintly with brownish grey, darker along crossveins of forewing; conspicuous greyish brown patches around pterostigma crossveins in both wings.

MALE GENITALIA (A–E): Tergite X produced into a huge pointed curved membranous cone. Epiproct long, slender, almost straight, with two large somewhat backward directed pointed ventral teeth, one apical and one subapical. Papaprocts long, tapering, somewhat variably strongly curving dorsad to narrow but rounded apices. Subgenital plate wide, almost perfectly semi-circular. Cerci with 11–15 segments.

FEMALE GENITALIA (F): Subgenital plate wide, somewhat produced medially, sclerotized and darkened laterally. Paraprocts slightly curved laterad, with rounded apices. Tergite X produced medially, but apex rounded. Cerci 12–14 segmented.

NYMPHS (G, H): 8.0–10.0 mm long (last instar); body greyish yellow to greyish brown with lighter pattern on head, femora and abdominal tergites. Prosternum produced strongly posterolaterally behind coxa to form sausage-shaped process. Posterior margin of tergite X as illustrated.

AFFINITIES AND DIAGNOSIS: *Illiesoperla cerberus* sp.n. appears to be a close ally of the much larger *I. australis* (Tillyard). Only these two species have really curved paraprocts and a narrow rounded incision on their bases. Both sexes of *I. cerberus* have a long, sausage-shaped process behind the procoxa and always several crossveins in the pterostigma area. Male *I. cerberus* have more pointed and backward directed ventral teeth on the epiproct and much longer, slenderer and stronger curved paraprocts than any other *Illiesoperla* species.

DISTRIBUTION: *Illiesoperla cerberus* sp.n. is known from many localities of tropical Queensland and may coexist with *I. tropica* sp.n.

ILLIESOPERLA FRANZENI (Perkins, 1958)
(Fig. 21H)

I. franzeni is not — as proposed by Hynes (1974) — regarded as a synonym of *I. australis* (Tillyard). *I. franzeni* and *I. australis* were found to coexist in the Wollondilly River in New South Wales. *I. franzeni* is easily distinguished from *I. australis* as well as from its other congeners by the lack of pterostigma crossveins in both sexes and by the very high and narrow, dorsally toothed epiproct and by pointed, dorsally sinuously curved paraprocts.

MATERIAL. New South Wales: 1 ♂, Boonoo-Boonoo R., NNE. of Tenterfield, 7.xi.1976, GT; 4 ♂, 3 ♀, Cangai Creek (main stream), 22.viii.1980, GT; 1 ♂, Wollondilly R., nr Goodmans Ford, 6.x.1976, GT, and 4 ♂, 3 ♀, same locality, 20/21.ix.1980, GT; all in GT. Queensland: as listed by Perkins (1958) on p. 96. 9 nymphs, Upper Brookfield, 28.ix.1954, colls J. Peaberdy and Y. Beri; in UQ.

NYMPHS (H): 11.0–12.0 mm long (last instar); dorsally yellowish to pale greyish brown, ventrally pale brownish yellow; no pattern discernible. Posterior margin of tergite X with narrow and very deep median process in male and with small conspicuously upturned median process in female nymph (as illustrated).

ILLIESOPERLA MAYI (Perkins, 1958) (Fig. 21I)

I. mayi is not — as proposed by Hynes (1974) — regarded as a synonym of *I. australis* (Tillyard). It can be separated from this species by its simple pointed paraprocts without enlargement of sclerotization near cercus base.

MATERIAL. New South Wales: 1 ♂, New England N.P., via Ebor, 22/23.i.1966, BKC; 1 ♂, New England N.P., 3/6.xii.1967, TW; both in UQ. Queensland: as listed by Perkins (1958) on p. 95. 8 nymphs, Lamington N.P., date and collector unknown; in UQ.

NYMPHS: 11.0–12.5 mm long (last instar); dorsally yellowish brown, ventrally pale greyish yellow, greyish brown pattern on head, pronotum and on femora. Posterior margin of tergite X about triangularly produced in male, rounded in female nymph (as illustrated).

ILLIESOPERLA PERKINSI McLellan, 1971

I. perkinsi is not regarded, as proposed by Hynes (1974), as a synonym of *I. australis* (Tillyard). It can be separated from this species by the rather low tapering epiproct and almost straight slender paraprocts without enlargement near cercus base and with upturned pointed tip.

I am, however, not yet convinced that *I. perkinsi* and *I. mayi* (Perkins) are distinct on specific level. As an attempt to resolve this problem shall be made in an extensive study of *Illiesoperla* (Theischinger, in preparation, on *Illiesoperla*) I do not list here the material I hitherto studied.

ILLIESOPERLA TASMANICA McLellan, 1971

I. tasmanica does not come close to *I. australis* (Tillyard) of which Hynes (1974) regarded it a

synonym. It is however related and probably a sister species of *I. franzeni* Perkins. *I. tasmanica* has not as *I. franzeni* a distinctive basal tooth on the dorsal edge of the epiproct but only a few hardly discernible crenulations instead. It has a much larger sclerotized area on the outer side of the paraprocts than *I. franzeni* and — unusual in the genus *Illiesoperla* — many very strong dark bristles on the membraneous inner side of the paraprocts.

MATERIAL. Holotype ♂, Tasmania, creek near Burnie, 25.xi.1966, J. Illies; in ANIC.

ILLIESOPERLA TROPICA, sp.n. (Fig. 21 A-G)

MATERIAL. Queensland: holotype ♂ and 16 paratypes (5 ♂, 11 ♀) and 15 nymphs, Lockerbie Area, Cape York, 13/17.iv.1973, SRM; holotype and 14 paratypes (4 ♂, 10 ♀) in ANIC, 2

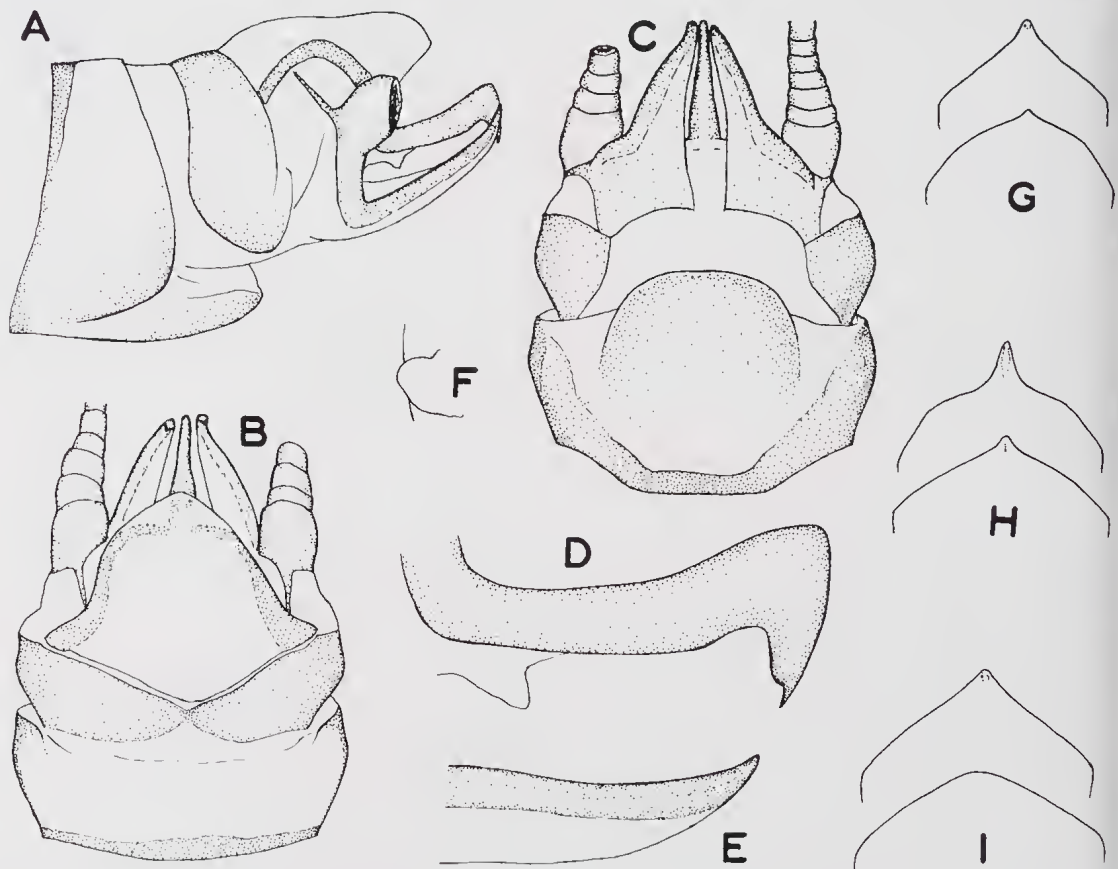


FIG. 21. A-G, *Illiesoperla tropica* sp.n.: A-E, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, tip of paraproct, lateral view; F, G, fully grown nymph: F, posterolateral corner of prosternum, ventral view; G, posterior margin of tergite X: top, male; bottom, female. H, *Illiesoperla franzeni* Perkins, fully grown nymph, posterior margin of tergite X: top, male; bottom, female. I, *Illiesoperla mayi* Perkins, fully grown nymph, posterior margin of tergite X: top, male; bottom, female.

paratypes (1 ♂, 1 ♀) in GT. 1 ♂, 1 ♀, Iron Range, 2/9.vi.1971, EFR; 1 ♀, Iron Range, Mt Tozer Foothills, 4.vi.1971, EFR; 1 ♂, 13 nymphs, Captain Billy Ck, Cape York Pen., 142°50'E/11°40'S, 9/13.vii.1975, SRM; 1 ♂, Peach Creek Crossing, 25 km NNE of Coen, 4/5.vii.1976, G.B. and S.R. Monteith; all in ANIC. 1 ♀, 5 mi. N. Bloomfield R., 7/9.v.1970, S.R. Curtis; 3 ♂, 1 ♀, Lockerbie Scrub, Cape York, 10/15.iv.1975, M.S. Moulds; all in AM. 1 ♀, 400 yds from Mulgrave R. at Gordonvale, 23.iv.1960, B.E. Hitchcock; 2 ♂, Gap Ck, 5 mi. N. Bloomfield R., 100 ft, 8/9.v.1970, GBM; all in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	9.0-10.5	10.0-12.0
♀	10.0-12.0	10.0-12.0

Body largely yellowish to brownish grey, ventral surface pale greyish yellow, dark yellow pattern on head. Black dots at base of meso- and meta-coxa; one black patch anteriorly on lateroventral edge of both meso- and meta-thorax. Wings suffused faintly with yellowish brown, greyish brown along crossveins of forewing. No pterostigma crossveins in both wings.

MALE GENITALIA (A-E): Tergite X produced into a slightly curved huge swollen obtuse membranous cone. Epiproct long, slender, apex strongly bent ventrad and produced into a hook with a moderately long pointed apical and a shorter blunt subapical tooth. Paraprocts short, almost straight with pointed and only very slightly upturned apex; no enlargement of sclerotization near cercus base. Subgenital plate wide, about semi-circular. Cerci with 13-15 segments.

FEMALE GENITALIA: Subgenital plate wide, posterior margin convex. Posterior margin of tergite X angulated, slightly additionally produced medially. Cerci with 13-15 segments.

NYPHS (F,G): 8.0-9.0 mm long (last instar): dorsal surface greyish brown with yellow mark between ocelli and narrow yellow midline from pronotum to abdominal tergite IX (inclusively), ventrally brownish yellow. Prosternum produced slightly posterolaterally behind coxa to form rounded knob. Posterior margin of tergite X as illustrated.

AFFINITIES AND DIAGNOSIS: *Illiesoperla tropica* sp.n. appears closest related to the much larger *I. mayi* (Perkins) from more southern regions of Queensland which it approaches in the shape of

male epiproct and paraprocts as well as in the shape of the female genitalia which are very uniform throughout the genus. There are, however, several crossveins present in the pterostigma area in both wings of all *I. mayi* specimens I have seen while such crossveins are absent in all studied *I. tropica*. *I. franzeni* (Perkins) from Queensland and New South Wales lacks crossveins in the pterostigma area as does *I. tropica*, but male epiproct and paraprocts of these two forms are remarkably different.

DISTRIBUTION: *Illiesoperla tropica* sp.n. is known from several places in tropical Queensland and may coexist with *I. cerberus* sp.n.

TONYOPERLA, subgen.n.

TYPE SPECIES: *Illiesoperla (Tonyoperla) frazieri*, sp.n., by monotypy.

CHARACTERS: Wings as in *Illiesoperla* s.str. and in addition 2-5 very conspicuous proximal crossveins between R and Rs.

MALE GENITALIA: As in *Illiesoperla* s.str. but (even in aged and heavily sclerotized specimens) sclerotization of paraproct base not extending mediad (= narrow based).

FEMALE GENITALIA: As in *Illiesoperla* s.str.

AFFINITIES AND DIAGNOSIS: In the structure of male genitalia *Illiesoperla (Illiesoperla) australis* (Tillyard) comes closest to *Tonyoperla* subgen.n. Both sexes of *Tonyoperla* can be distinguished, however, from all species of *Illiesoperla* s.str. by the presence of conspicuous proximal crossveins between R and Rs in forewing, and the male by the narrow based sclerotization of the paraprocts. NAME: named for my friend Prof. A. (Tony) F. O'Farrell, Armidale.

ILLIESOPERLA (TONYOPERLA) FRAZIERI, sp.n.
(Fig. 22 A-E)

MATERIAL. New South Wales: Holotype ♂, New England N.P., via Ebor, 22/23.i.1966, BKC; in QM (T.8522). 1 paratype ♂, New England N.P., 22.ii.1967, and 1 paratype ♂, same locality, 3/6.xii.1967, TW; both in UQ. 1 paratype ♂, New England N.P., Pt Lookout, 21.iv.1960, C.W. Frazier; in GT. 1 paratype ♂, New England N.P., nr entrance, 8.iv.1961, C.W. Frazier; 1 ♀, locality, date and collector unknown; both in UNE.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	13.5–15.0	19.0–20.0
♀	18.0	20.5

Body largely yellowish to medium brown, the light areas being particularly the ventral surface of head and thorax, the sides of meso- and meta-thorax and inner side of legs; a diamond-shaped yellow patch between ocelli, two pale yellow patches on outer side of all femora; black

along posterior side of median ocellus and along proximal side of lateral ocelli, two black dots at base of meso- and meta-coxa and one brownish black to black spot anteriorly on lateroventral edge of both, meso- and meta-thorax. Wings (A) slightly suffused with greyish yellow, greyish brown some distance between C and R, markedly darker patches around all crossveins particularly in pterostigma area of forewing; hindwing with faintly darker patches around pterostigma crossveins only.

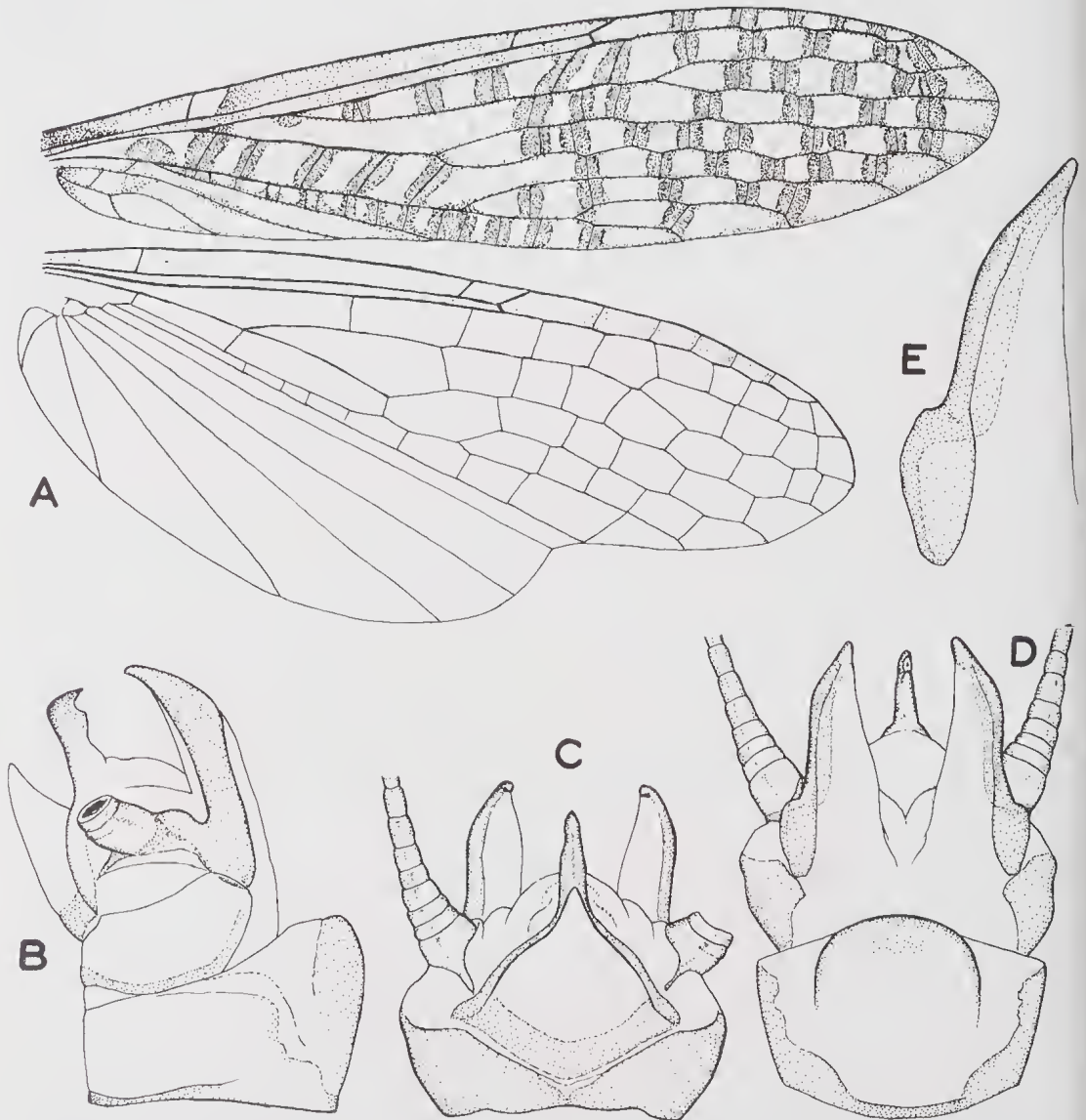


FIG. 22. *Illiesoperla (Tonyoperla) frazieri* sp.n., male: A, wings; B–D, genitalia: B, lateral view; C, dorsal view; D, ventral view; E, paraproct, ventral view.

MALE GENITALIA (B-E): Tergite X produced into a large pointed almost straight membranous cone. Epiproct rather short deep with well defined apical and not well defined subapical tooth. Paraprocts very strong; base sinuously thickened near cercus base; otherwise broad, sclerotization slightly widened at about two thirds length, tip not markedly pointed. Subgenital plate wide, well rounded. Cerci with 16-19 segments.

FEMALE GENITALIA: Subgenital plate wide, posterior margin almost straight. Paraprocts rather long. Cerci with basal segment at least as long as following 3 segments; 16 segmented. Posterior margin of tergite X produced medially into a small but distinctive tongue-shaped process.

AFFINITIES AND DIAGNOSIS: discussed under *Tonyoperla*.

DISTRIBUTION: Hitherto known only from New England N.P. where it coexists at least with *I. (I.) mayi* Perkins in the same streams.

TRINOTOPERLA GROOMI Perkins, 1958
(Fig. 23 A-F)

Hynes (1974) synonymized *T. groomi* and *T. minor* Kimmins with *T. nivata* Kimmins.

Having studied all available material of *T. groomi* I found that it certainly is a distinct species which coexists with *T. minor* for example at Lamington National Park and at Crystal

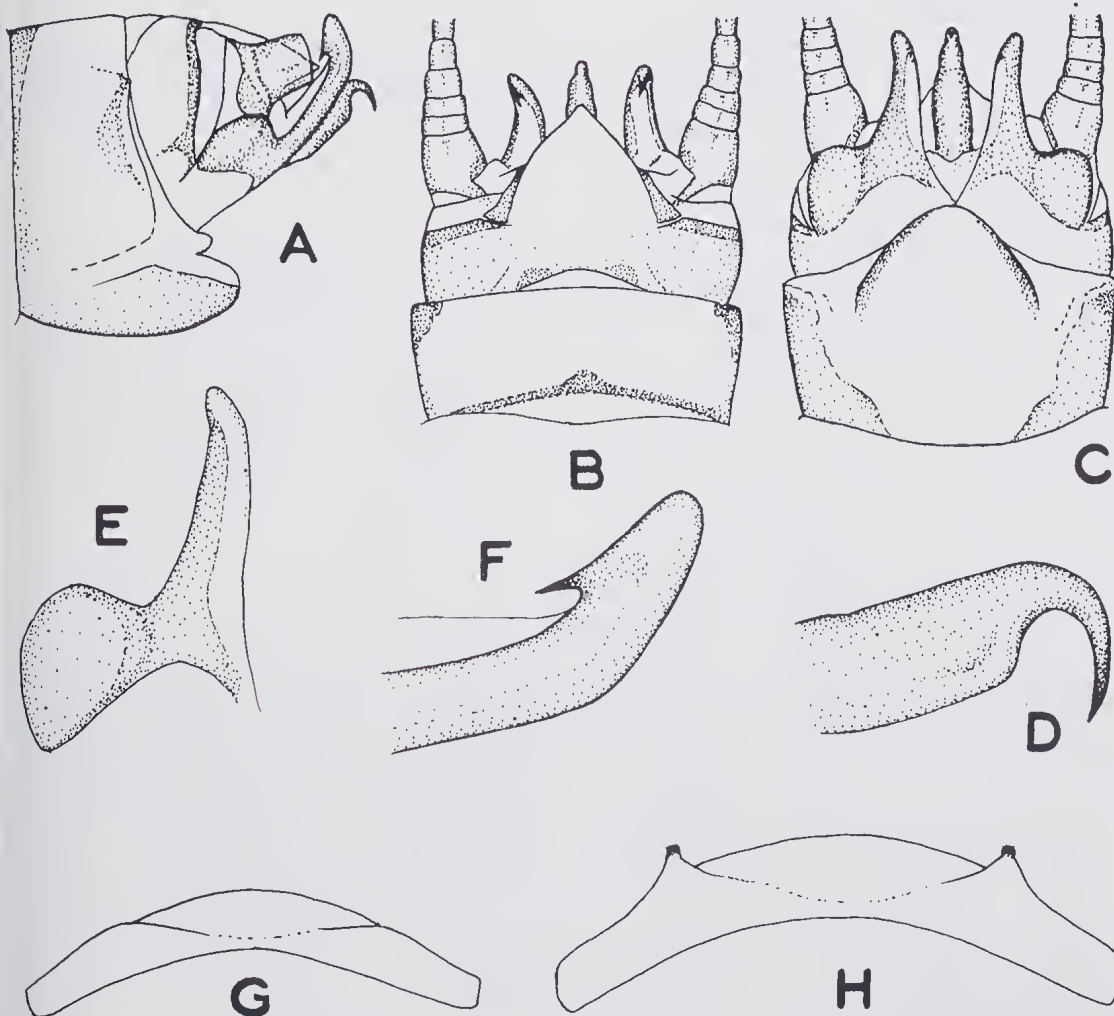


FIG. 23. A-F, *Trinotoperla groomi* Perkins, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, ventral view; F, tip of paraproct, lateral view. G, *Trinotoperla montana* Riek, nymphal pronotum, frontal view. H, *Trinotoperla yeoi* Perkins, nymphal pronotum, frontal view.

Cascades in Queensland. I regard *T. nivata* which has never been taken in northern New South Wales or in Queensland as a member of another species group. Perkins (1958) had unfortunately designed a male from Natural Arch, Numinbah (Queensland), which I identified in the course of this study as *T. minor*, as allotype of *T. groomi* and most probably used for the illustration of this species (Fig. 1b,c). This could be a reason why Hynes (1974) regarded *T. groomi* a synonym of *T. nivata* (and most probably *T. minor*) without seeing any *T. groomi*. Most material from Lamington National Park and the specimen from Killarney Perkins (1958) listed under *T. groomi* also belong to *T. minor*.

To prove my statements above I describe and illustrate here in detail the male of *T. groomi* from the type locality (Bunya Mountains).

MATERIAL. Queensland: Bunya Mts: Holotype ♀ and 33 paratypes (♀), 30.ix.1954, J.L. Groom and A.W. May; holotype in QM, paratypes in UQ. 2 ♀, 30.ix.1954, A.W. May; 2 ♀, 30.ix.1954, collector unknown; 4 ♀, 30.ix.1954, J.L. Groom; 1 ♀, N.P., via Toowoomba, 15.ix.1954, J.L. Groom; 1 ♀, 10 nymphs 10.viii.1955, TEW; 1 ♀, M'Grory Falls, 24.x.1958, S. Sekhon; 1 ♂, 2 ♀, 11/12.ii.1967, BKC; 1 ♀, 5.vi.1969, ICY; all in UQ; 1 ♀, 4.vii.1971, EFR; in ANIC. Crystal Cascades: 1 ♂, 2 ♀, ?v.1963, K. Korboot; 1 ♂, ?v.1969, K.K.; all in UQ. Eungella Ra.: 1 ♀, 19.v.1937, FAP; 1 paratype ♂, Broken R., 17.vi.1955, A. May; 2 ♂, 3 ♀, Broken R., The Rapids, 2000ft, 27.vii.1956, TEW; all in UQ; 2 ♀, Broken R., 27.v.1971, EFR; in ANIC. 1 paratype ♂, Highvale, 30.iii.1955, coll. Harrison; in UQ. Kondalilla N.P.: 1 ♀, 2.iii.1962; 1 ♂, 17.iii.1962, M.A. Tesch; in UQ. 1 ♀, Lamington N.P., 26.iii.1961, K. Legessnek; in UQ. 1 ♂, Mapleton, 12.iv.1952, J.G. Morris; in UQ. Mt Nebo: 2 ♀, 17.iv.1955, W. Horne; 1 paratype ♀, 14.vii.1955, W.R. Horne; 1 paratype ♂, 15.viii.1955, D.J. Woodland; all in UQ. 1 ♂, locality, date and collector unknown; in GT.

MALE: Measurements: Body 12.0–14.0 mm; forewing 14.0–17.0 mm. Body and wings generally matching the description of the female by Perkins (1958).

GENITALIA (A–F): Tergite X produced into a rather short membranous cone. Epiproct not deep, broad, long based, with strongly downcurved long and sharp spine. Paraprocts with very wide base, otherwise slim, apical forth strongly curved dorsad and bearing a sharp spine. Subgenital plate oval. Cerci 14–16 segmented.

NYPHS: 9.0–10.0 mm long (last instar, but not yet fully grown), greyish yellow to greyish brown without clear pattern. Head with some long hairs. Dorsal surface of body largely smooth; larger groups of spines along margins of pronotum; middorsal hairbrush on abdominal tergites I–X, one spine each side of it on posterior border of tergites I–IX.

AFFINITES AND DIAGNOSIS: *Trinotoperla groomi* Perkins is certainly a close ally of *T. minor* Kimmins and *T. minima* sp.n. Diagnostic characters of male *T. groomi* are the low, broad and long based epiproct with its strongly downcurved spine and the almost angulated paraprocts together with the lack of C–Sc crossveins.

DISTRIBUTION: *T. groomi* is known from several localities from northern to southern Queensland. In Crystal Cascades it is found sympatrical with *T. minor* Kimmins and *T. minima* sp.n., the two species considered its closest relatives.

TRINOTOPERLA MAIOR, sp.n. (Fig. 24 A–G)

MATERIAL. New South Wales: Holotype ♂ and 4 paratypes (3 ♂, 1 ♀), New England N.P., via Ebor, 22/23.i.1966, BKC; holotype (T.8523) and 1 paratype (♀) (T.8524) in QM, 2 paratypes (♂) in UQ, 1 paratype (♂) in GT. 2 paratypes (1 ♂, 1 ♀), Pt Lookout, via Ebor, 22.i.1967, BKC; in UQ. 2 ♂, 4 ♀, Dorrigo N.P., 30.i.1963, C.W. Frazier; in UNE. 2 ♂, 3 ♀, locality, date and collector unknown; in UNE.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	14.0–18.0	17.0–21.0
♀	16.0–21.0	19.0–23.0

Body largely greyish brown; black dots anteriorly on lateroventral edge and at base of coxa of meso- and meta-thorax; blackish brown at knees; all femora with pattern, and with well developed distal spur. Wings slightly suffused with whitish grey, greyish brown along all crossveins in forewing particularly in pterostigma area, only along pterostigma crossveins in hindwing. A set of C–Sc and 1A–2A crossveins in forewing, a few C–Sc crossveins in hindwing. Distal half of anal fan between 1A and 4A with rich irregular venation.

MALE GENITALIA (A–F): Tergite X produced into a short inconspicuous obtuse membranous cone. Epiproct with high and well expanded base, produced into a long strongly downcurved sharp

spine. Paraprocts of medium length, slender, slightly bowed, with rounded apices, a forward directed tooth about one fifth of their length from apex. Subgenital plate rather narrow, but well rounded apically. Cerci 16–19 segmented.

FEMALE GENITALIA (G): Subgenital plate wide with posterior border slightly concave; a very conspicuous black and strongly sclerotized M-shaped mark over almost its whole length and width. Paraprocts curved laterad, apices rounded. Tergite X produced medially into rounded apex. Cerci 16–20 segmented.

AFFINITIES AND DIAGNOSIS: *Trinotoperla maior* sp.n. is considered closely related to *T. nivata* Kimmins and *T. mouldsi* sp.n. It can be distinguished from these species by the distinctive epiproct and paraprocts in male and by the well defined black mark on the subgenital plate of the female.

DISTRIBUTION: *Trinotoperla maior* sp.n. is hitherto known only from New England and Dorrigo N.P., both localities in north-eastern New South Wales.

TRINOTOPERLA MINIMA, sp.n. (Fig. 25 A–G)

MATERIAL. Queensland: Holotype ♂ and 68 paratypes (35 ♂, 33 ♀), Palmerston N.P., Beatrice R., 27.vi.1971, EFR; 2 ♂, 3 ♀, Atherton Tableland, The Crater, 25.iv.1970, S.R. Curtis; 6 ♀, Crystal Cascades, nr Cairns, 10.vi.1971, EFR; 11 ♂, 13 ♀, Mossman Gorge, 16.vi.1971, EFR; 2 ♀, 2 km on Mt Edith Rd, Tinaroo Dam, 23.vi.1971, EFR; 6 ♂, 2 ♀, 40 km W. of Tully, 31.v.1971, EFR; 1 ♂, 2 ♀, Little Mulgrave R., 28.vi.1971, EFR; 10 ♂, 27 ♀, Upper Mulgrave R., via Gordonvale, 29/30.iv.1970, S.R. Curtis; all in ANIC. 5 ♀, Mena Ck nr Mt Utchee, 145°52'/17°40', 17.xi.1976, LM and GT; 2 ♂, 15

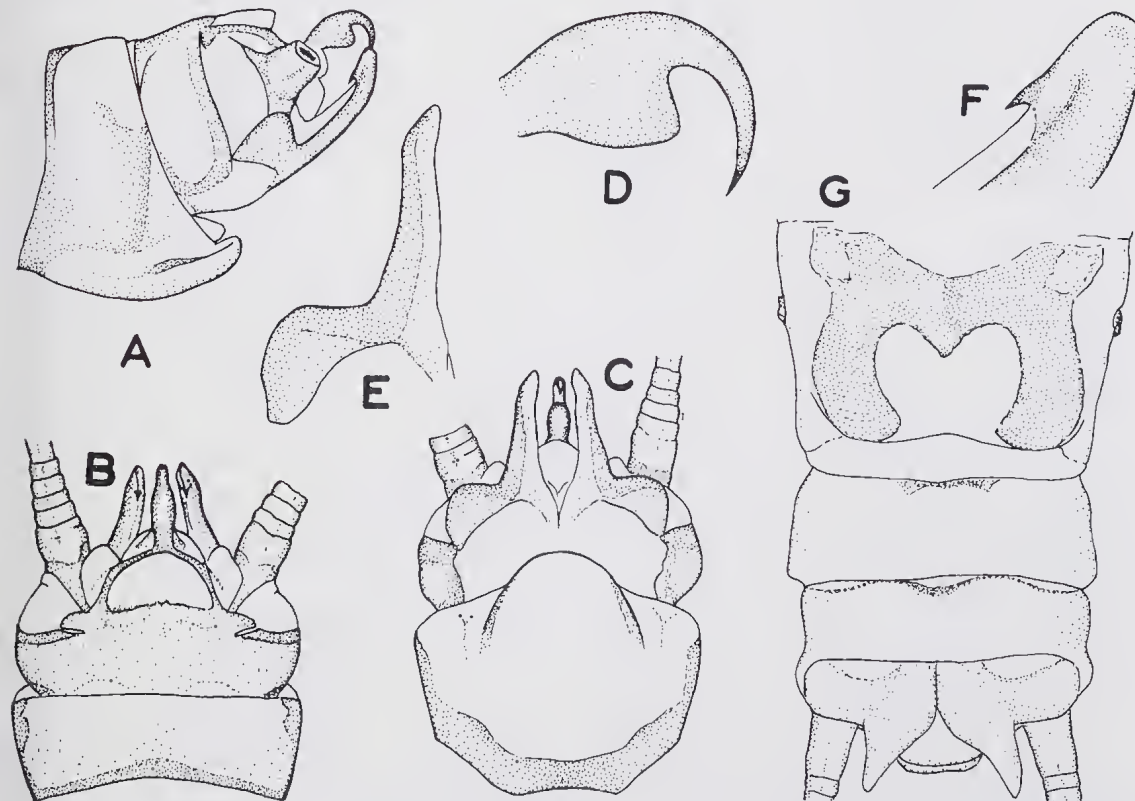


FIG. 24. *Trinotoperla maior* sp.n.: A–F, male: A–C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, ventral view; F, tip of paraproct, lateral view; G, female genitalia, ventral view.

♀, Mossman Gorge, 145°52'/16°27', 19-25.xi.1976, LM and GT; all in GT. 1 ♀, The Boulders, via Babinda, 15.xii.1966, BKC; 1 ♀, Crater N.P., Dinner Falls, 9.viii.1968, TW; 7 ♂, 4 ♀, Ringrose (= Crater) N.P., via Atherton, 9.xii.1966, BKC; all in UQ. Crystal Cascades, via Cairns: 1 ♂, 3 ♀, 30.xii.1963 and 2 ♀, 22.xii.1964, GBM; 1 ♀, 20.v.1966, D. Forno; 2 ♀, 8.viii.1966, GBM; 4 ♀, 6.xii.1966, GBM; all in UQ. 1 ♂, Kirrama State Forest, via Cardwell; 1 ♀, St. Lucia, 30.vi.1956, R. Howlett; 3 ♂, Zillie Falls, 12.viii.1968, TW; all in UQ. Upper Mulgrave R.: 1 ♂, 1 ♀, 1/3.xii.1965 and 1 ♂, 1 ♀, 30.iv.1970, GBM; all in UQ. Mossman Gorge: 5 ♂, 2 ♀, 10.viii.1969, TW; via Mossman, 23 ♀, 25/26.xii.1964, GBM; 13 ♂, 43 ♀, 7.xii.1966, BKC, and 1 ♂ 1 ♀, 2.vi.1971, BKC; all in UQ. Palmerston N.P.: 20 ♂, 20 ♀, 22.iv.1968, BKC; 2 ♂, 1 ♀, 25 nymphs, 8/12.viii.1968, TW; via Innisfail, 14 ♂, 16 ♀, 23.iv.1968, GBM; Henrietta Ck, 3 ♀, 5.xii.1965, GBM; all in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	8.0-10.0	8.5-10.5
♀	9.0-11.0	10.0-12.5

Dorsal surface of body and legs largely greyish brown, ventral surface pale yellow; pale yellow pattern on head and femora; black marks as described for *T. maior* sp.n.; distal spur minute on meso- and meta-femur, absent on profemur. Wings suffused faintly with greyish yellow, small greyish brown patches around all crossveins of forewing, larger reddish brown patches around pterostigma crossveins or indications of such in both wings. No C-Sc crossveins in anal fan.

MALE GENITALIA (A-E): Tergite X produced into a conspicuous subtriangular membranous cone. Epiproct short, slender, slightly S-curved, with pointed apex. Paraprocts of moderate length, slender, slightly bowed, with rounded apex, a forward directed tooth about one third of their length from apex. Subgenital plate of medium width, oval. Cerci with 11-13 segments.

FEMALE GENITALIA (G): Subgenital plate very wide and rather short, hind margin slightly incised medially and thus appearing bilobed. Paraprocts with swollen base and narrow rounded apex. Tergite X produced medially, but apex rounded. Cerci 10-14 segmented.

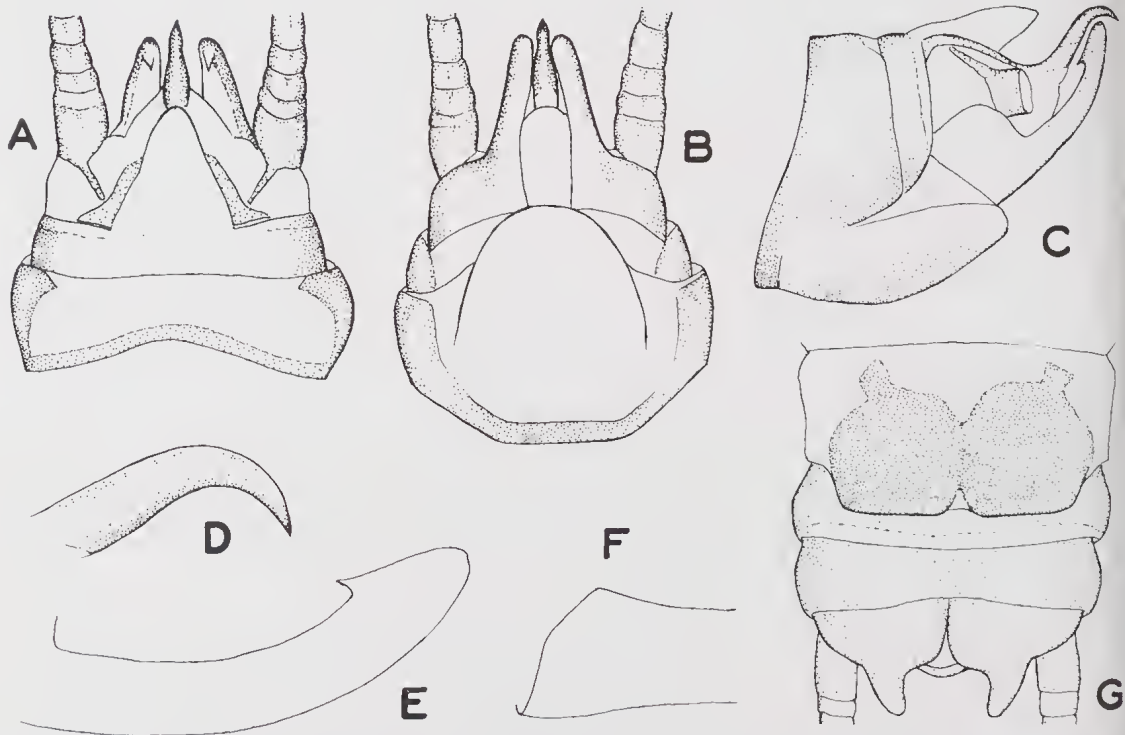


FIG. 25. *Trinotoperla minima* sp.n.: A-E: male: A-C, genitalia: A, dorsal view; B, ventral view; C, lateral view; D, epiproct, lateral view; E, paraproct without base, lateral view; F, G, female: F, apex of profemur, dorsal view; G, genitalia, ventral view.

NYPHS: 8.0–9.0 mm long (last instar); body yellowish to dark brown with inconspicuous pattern on head prothorax and femora. Head with some long hairs. Dorsal surface of the body largely smooth; a few single spines along margins of pronotum; a median hairbrush on all abdominal tergites and one spine each side of it on posterior border of tergites I–IX.

AFFINITIES AND DIAGNOSIS: *Trinotoperla minima* sp.n. is closely allied with *T. minor* Kimmins from Victoria, New South Wales and Queensland, and *T. groomi* Perkins from Queensland. Both these species, however, are much larger than *T. minima* and have femoral processes in all legs while the forelegs of *T. minima* are unarmed. The differences between *T. minor* and *T. minima* in the genitalia, particularly the male, are not very substantial.

DISTRIBUTION: *Trinotoperla minima* sp.n. has hitherto been found in many localities, mainly smaller streams in tropical Queensland. Other *Trinotoperla* collected in the same habitats: *T. groomi*, *T. minor*, *T. mouldsi* sp.n.

TRINOTOPERLA MINOR Kimmins, 1951

T. minor was regarded a synonym of *T. nivata* Kimmins by Hynes (1974). As expressed and pointed out under *T. nivata* (q.v.) I believe that *minor* and *nivata* belong to different species groups within *Trinotoperla*.

MATERIAL. Victoria: 1 specimen, Lalal Falls, 15 mi. from Ballarat, 5.ii.1957, FAP; in UQ. 18 ♂, 5 ♀, Otways, Hopetown Falls, 18.ii.1970, EFR; in ANIC. New South Wales: Barrington House, via Salisbury: 1 ♀, 27.v.1963; 2 ♂, 1 ♀, 18.xii.1963; 1 ♂, 19.xii.1963, A. Macqueen; in UQ. 1 ♀, Ebor, 14.xii.1964, G. Wearne; in ANIC. 10 ♂, 56 ♀, Ebor Falls, 10.xi.1957, FAP; 1 ♀, Kiandra, 6.ix.1962, EFR; 1 ♀, Mt Kosciusko, 31.xii.1960, B. Willson; 1 ♀, Rocky Crossing, Williams R., via Salisbury, 27.v.1963, A. Macqueen; all in UQ. 1 ♂, 1 ♀, Serpentine R., 19/20.ii.1966, EFR; in ANIC. 1 ♂, Mulerindi, 10 km N. of Tamworth, 6.xi.1976, GT; 1 ♂, Shellbrook Ck nr Barrington Tops, 10.x.1976, LM and GT; 1 ♂, 2 ♀, Wollondilly R. nr Goodmans Ford, 6.x.1976, GT; all in GT. Queensland: Brisbane: 1 ♀, 20.vi.1949, T. Robertson; 1 ♀, 1958, students; 1 ♀, 4.v.1962, J. Miller; 1 ♀, Binna Burra, 20.v.1962, B. Bateman; 1 ♂, Christmas Ck, 10.vi.1967, P. Farlow; Crystal Cascades, via Cairns: 3 ♂, 5 ♀, ?.v.1962 and 1 ♂, 1 ♀, ?.v.1969, K. Korboot; 1 ♂, 2 ♀, Deep Ck, via Redlynch, ?.v.1963, K. Korboot; all in UQ. 1 ♂,

Flaggy Ck, Mistake Mts, via Laidley, 11.ii.1973, SRM; in UQ. 1 ♀, Gwongorella N.P., 6/7.xii.1976, GT; in GT. 1 ♀, Killarney, 9.v.1960, H. Dunston; 1 ♂, Killarney District, 3.iv.1955, N. Loveday; both in UQ. Lamington N.P.: 1 ♀, 30.v.1929, FAP; 1 specimen, 8.iv.1939, FAP; 1 ♂, ?.viii.1947, collector unknown; 2 ♀, 31.v.1955 and 1 ♂, 12 ♀, 1/5.vi.1955, FAP and ICY; 2 ♂, 8 ♀, 2/6.v.1956 and 1 ♀, 20.viii.1956, ICY; 1 ♀, 26.v.1959, E. Bernays; 1 ♀, 22.v.1962, A. Webb; 1 ♂, 11/17.ii.1963, A. Macqueen; 1 specimen, 17/21.v.1965, S.R. Curtis; all in UQ. 1 ♂, Mt Tamborine, 21.ix.1962, B. Andrews; 1 ♂, Natural Arch, Numinbah, 1.xi.1954, FAP; 1 ♂, R. Albert R., 17.ix.1958, S. Rigby; 1 ♂, Running Ck, via Beaudesert, 5.iii.1967, H. Buchanan; all in UQ.

TRINOTOPERLA MONTANA Riek, 1962 (FIG. 23 G)

T. montana, described from rich material of both adults and larvae by Riek (1962), was synonymized with *T. yeoi* Perkins by Hynes (1974). There is no doubt that these two names were given to very similar and probably closely related stoneflies. The discovery of the larva of *T. yeoi* (q.v.), however, brought to light a very significant character quite unique in the genus *Trinotoperla*. This, together with constant differences in the adults, which will be pointed out in detail elsewhere (Theischinger, in preparation, on *Trinotoperla*), in my opinion sufficiently justifies considering *T. montana* and *T. yeoi* as two separate species.

MATERIAL. New South Wales: As listed by Riek (1962) on p. 98.

TRINOTOPERLA MOULDSI, sp.n. (Fig. 26 A–H)

MATERIAL. Queensland: Holotype ♂ (T.8525) and 1 paratype ♀ (T.8526), Ringrose (=Crater) N.P., via Atherton, 9.xii.1966, J. Goward; in QM. 2 ♀, Kirrama State Forest, via Cardwell, 16.xii.1966, BKC; 1 ♀, in UQ, 1 ♀, in GT. 1 ♀, Crater N.P., Dinner Falls, 9.viii.1968, TW; 1 ♀, Baldy Mtn Rd, 6 mls SW. Atherton, 1100 m, 27.xii.1972, BKC; both in UQ. 1 ♂, The Crater, nr Herberton, 6.i.1967, D.K. McAlpine and G. Holloway; 3 ♀, Kirrama State Forest, 24 km WNW. of Kennedy, 28.i.1981, M.S. and B.J. Moulds; all in AM.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	13.0	16.0
♀	15.0–17.0	18.0–20.0

Body coloured as described above for *T. maior* sp.n. Distal spur less prominent in meso- and meta-femur, minute to absent in profemur. Wings as in *T. maior* but pterostigma crossveins covered by extensive oval patches of dark reddish brown in both wings; only very few crossveins between 1A and 2A of forewing, generally no C-Sc crossveins and no anal crossveins in hindwing.

MALE GENITALIA (A-F): Central sclerite of tergite X produced posteriorly into a short very wide moderately deep membranous lobe. Epiproct with wide base and heavy, strongly downcurved hook. Papaprocts with very narrow base, otherwise bowed mediad with short, not much pointed apical hook, twisted inward. Subgenital plate oval. Cerci 16 segmented, inner basal sclerite not projecting.

FEMALE GENITALIA (G,H): Subgenital plate very wide with small median incision on hind margin, heavily sclerotized all over. Hind margin

of tergite X produced medially but apex well rounded. Paraprocts narrow, about as long as wide. Cerci with 13-15 segments.

AFFINITIES AND DIAGNOSIS: *Trinotoperla mouldsi* sp.n. is certainly closely related to *T. nivata* Kimmins and *T. maior* sp.n. It can be distinguished from both species by its narrow based paraprocts in both sexes.

DISTRIBUTION: *Trinotoperla mouldsi* sp.n. is hitherto known only from 3 localities in tropical Queensland: Kirrama State Forest, Baldy Mtn and Crater N.P. It coexists with *T. minima* sp.n. in Crater N.P.

TRINOTOPERLA NIVATA Kimmins, 1951

Hynes (1974) synonymized *T. minor* Kimmins and *T. groomi* Perkins with *T. nivata*. I do not believe, however, on the evidence of the material

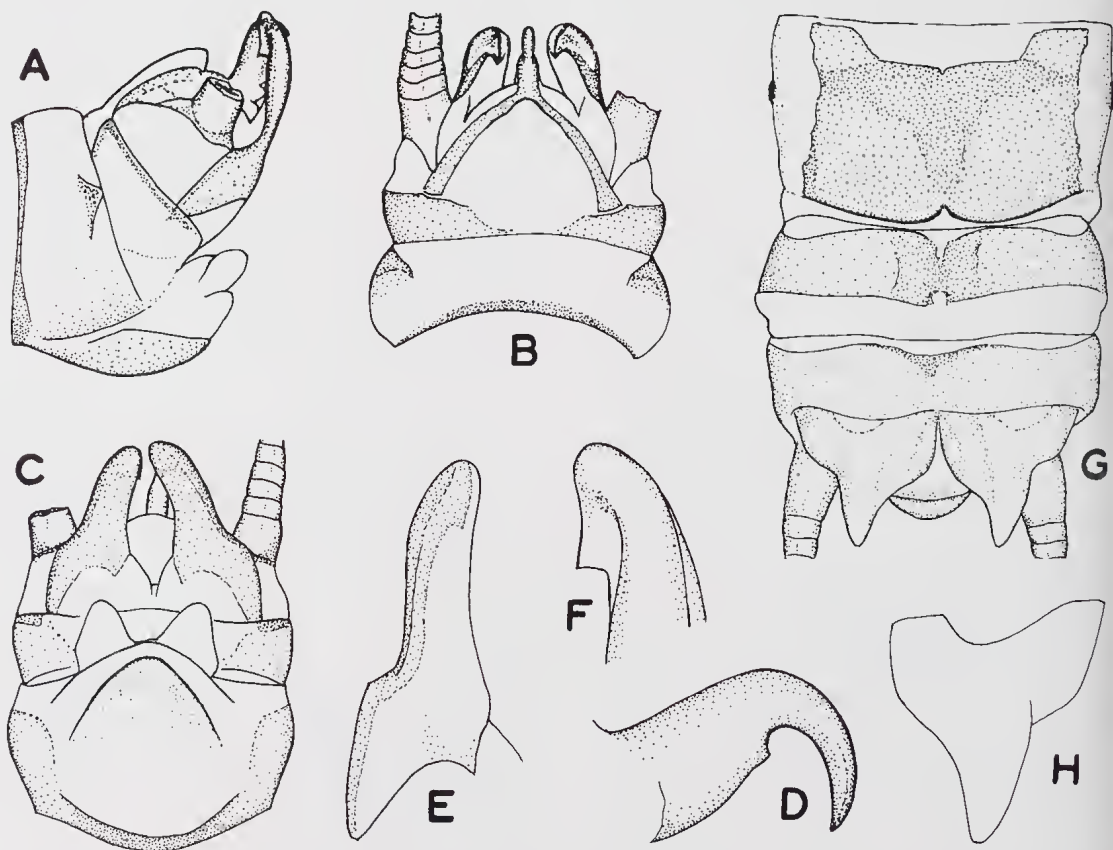


FIG. 26. *Trinotoperla mouldsi* sp.n.: A-F, male: A-C, genitalia: A, lateral view; B, dorsal view; C, ventral view; D, epiproct, lateral view; E, paraproct, ventral view; F, tip of paraproct, lateral view; G, H, female: G, genitalia, ventral view; H, paraproct, ventral view.

from southern New South Wales and Victoria I have hitherto seen, that *T. nivata* and *T. minor* are one and the same. Moreover, on the evidence of rich material from northern New South Wales and Queensland, I think that *T. minor* and *T. nivata* belong to different species groups even if eventually areas will be found where they interbreed.

I regard as *nivata* group (C-Sc crossveins present) *nivata* Kimmins, *maior* sp.n. and *mouldsi* sp.n. and as *minor* group (no C-Sc crossveins) *groomi*, *minima* sp.n., *minor* Kimmins and *sinuosa* sp.n. There is no doubt that *maior*, *mouldsi* and *sinuosa* are different from *nivata* and *minor* or from possibly interbreeding populations on morphological reasons. That *groomi*, *minor* and *minima* coexist for example at Crystal Cascades (Queensland) leaves little doubt about their specific distinctness from each other.

T. nivata was illustrated in detail by Hynes (1974) in Fig. 13 (right). Apart from the C-Sc crossveins I found the strongly developed inner sclerotization at the cercus base a good character for the identification of *T. nivata* males (well figured by Hynes).

MATERIAL. Victoria: 1 ♂, 8 ♀, Gonyah, March 1956, G. Bornemissa; in ANIC. 4 ♂, 1 ♀, Mt Bogong-Tawonga, 31.xii.1976, GT; in GT. 1 ♂, Warburton, 2.viii.1967, TW; in UQ. New South Wales: 1 ♂, 4 ♀, Fitzroy Falls, 22.iii.1961, EFR; 1 ♀, Kiandra, 17.ii.1961, EFR; all in ANIC. Mt Kosciusko: 1 ♀, 10.ii.1980, GT; 7 ♂, 20 ♀, Diggers Ck, 1200m, 10.ii.1980, C., D. and G. Theischinger; 1 ♂, 1 ♀, Perisher Ck, 1500m, 10.ii.1980, GT; all in GT. 1 ♂, Blue Mts, Wentworth Falls, Leura, 13.xii.1959, P.R. Webb; in UQ.

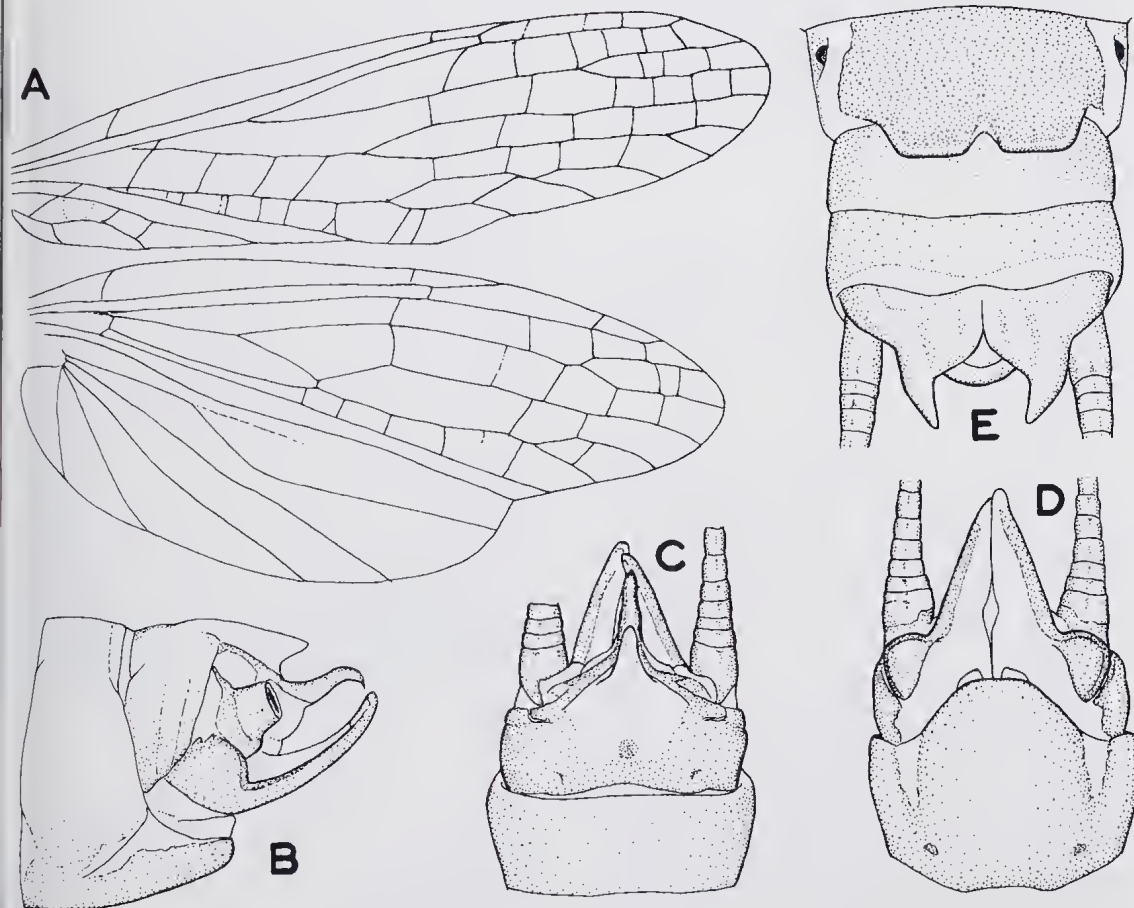


FIG. 27. *Trinotoperla sinuosa* sp.n.: A-D, male: A, wings; B-D genitalia: B, lateral view; C, dorsal view; D, ventral view; E, female genitalia, ventral view.

TRINOTOPERLA SINUOSA, sp.n. (Fig. 27 A-E)

MATERIAL. Victoria: Holotype ♂, 2 paratypes (1 ♂, 1 ♀) and 15 nymphs, Mt Langi Ghiran, 17.xii.1966, EFR; 1 ♀, Mt Buangor, 17.xii.1966, EFR; all in ANIC. 1 ♂, locality, date and collector unknown; in GT. 1 ♂, McKenzie Falls, 11 mi. from Halls Gap, 6.ii.1957, FAP; in UQ.

ADULTS: Measurements (in mm):

	Body	Forewing
♂	10.5-13.5	10.5-14.5
♀	13.0-15.0	15.0-16.5

Body and legs largely yellowish grey to dark brown, indistinctive brownish yellow pattern on head and on femora. Distal spur on all femora. Wings (A) slightly suffused with greyish brown, darker between C and R and along all crossveins of forewing. No C-Sc crossveins; a few crossveins between 1A and 2A in forewing; no crossveins in anal fan, 2A strongly sinuous in hindwing.

MALE GENITALIA (B-D): Tergite X produced into a narrow slender membranous process. Epiproct short with base hardly expanded and pointed apex. Paraprocts of medium length, slightly bowed and tapered without any tooth. Subgenital plate long and wide, oval. Cerci 18-19 segmented.

FEMALE GENITALIA (E): Subgenital plate rather narrow with deep medial incision on hind margin. Paraprocts with broad base and narrow tapered apex. Hind margin of tergite X produced medially but apex rounded. Cerci 17-18 segmented.

NYMPHS: 12.0-13.5 mm long (last instar); dorsal surface greyish brown, ventrally yellowish grey. Head without long hairs. Dorsal body surface, particularly abdominal tergites, largely covered with many scattered spines; one slightly larger spine each side and close to midline on posterior border of tergites I-IX; a barely developed median hairbrush on all abdominal tergites.

AFFINITIES AND DIAGNOSIS: *Trinotoperla sinuosa* sp.n. is certainly closely related to *T. minor* Kimmins, *T. groomi* Perkins and *T. minima* sp.n. It can be distinguished from all of them by the strong arch of 2A in the hindwing of both sexes. Additionally the male stands out by entirely unarmed narrow based paraprocts, the female by a definitely bilobed subgenital plate.

DISTRIBUTION: *Trinotoperla sinuosa* sp.n. seems to be restricted to the southwest of Victoria.

TRINOTOPERLA WOODWARDI Perkins, 1958

Though refraining from formally suggesting that *T. woodwardi* is a synonym of *T. irrorata* Tillyard, Hynes (1974) expressed that he personally had little doubt that these two large species are one and the same. Having studied the holotype and all other available material of *T. woodwardi* as well as a fine series of *T. irrorata* from different localities in southern New South Wales I have no doubt at all that they are distinct on specific level. Details of the genitalia of both species have been figured already reasonably well and correctly by Perkins (1958), McLellan (1971) and Hynes (1974).

MATERIAL. Queensland: As listed by Perkins (1958) on pp. 93, 94.

TRINOTOPERLA YEOI Perkins, 1958 (Fig. 23H)

T. yeoi, described from Lamington National Park in Queensland, was considered the older synonym for *T. montana* Riek by Hynes (1974). Plentiful material of *T. yeoi* from Queensland and New South Wales, particularly the discovery of its larvae, however, made me consider *T. montana* and *T. yeoi* as two distinct species. Only the larva of *T. yeoi* is characterized below while the imaginal characters of *T. montana* and *T. yeoi* will be pointed out in detail elsewhere (Theischinger, in preparation, on *Trinotoperla*).

MATERIAL. New South Wales: 10 ♂, 6 ♀, 33 nymphs, Allyn R., nr Barrington Tops, 18.viii.1980, GT; in GT. Queensland: As listed by Perkins (1958) on pp. 95, 98. 12 nymphs, Lamington N.P., 20.viii.1956, ICY; in UQ.

NYMPHS: 10.5-12.5 mm long (last instar); dorsally greyish brown, ventrally pale greyish yellow; pale whitish yellow pattern on femora. Dorsal body surface clothed with scattered short spines; a faintly developed hairbrush along midline of abdomen; conspicuous conical swellings, beset with many small spines on top, each side on pronotum.

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- Hynes (1978) in "An annotated key to the nymphs of the stoneflies (Plecoptera) of the State Victoria" (Aust. Soc. Limnol. Spec. Pubn. 2, 1-63), a publication that did not become available to me before submission of the manuscript of the above paper, realizes that he was wrong when synonymizing *Dinotoperla fontana* Kimmins with *D. serricauda* Kimmins (Hynes 1974). He maintains, however, his view (Hynes 1974) on the synonymy of the other *Dinotoperla* and of the *Illiesoperla* and *Trinotoperla* species as recorded above. Under *Trinotoperla nivata* Kimmins he comments on the possible existence of an undescribed *Trinotoperla* in the Grampians the female of which he had already figured (Hynes 1974, under *T. nivata*). This species is no other than *T. sinuosa* sp.n. as described above.